NOLOGY DEPARTMENT

THE CHEMICAL AGE

VOL LVII 9 AUGUST 1947 No 1465

PUBLIC LIBRARY
AUG 19 1947
DETROIT

ACRIDINES

CHLOROFORM

CHLORAMINE

IODIDES

Boots

Enquiries should be made to the
WHOLESALE AND EXPORT DEPARTMENT
BOOTS PURE DRUG CO LTD
NOTTINGHAM ENGLAND

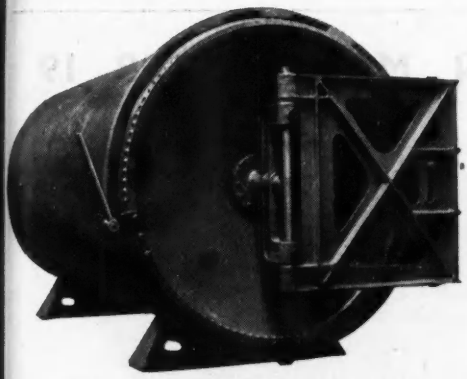
TRADE B-O-S-S MARK
VALVES, OF ALL TYPES IN ALL METALS FOR ALL PRESSURES AND DUTIES
WE SPECIALISE IN ENGINEERS' REQUIREMENTS FOR THE CHEMICAL AND ALLIED TRADES.
STANDARD PRODUCTIONS FROM STOCKS AT:— LONDON, LIVERPOOL, WHISTON, GLASGOW, BRISTOL, MANCHESTER & NEWCASTLE-ON-TYNE

BRITISH STEAM SPECIALTIES LTD.
WHARF STREET, LEICESTER

ACIDS
★ NEW BUYERS ESPECIALLY INVITED
• METAL FINISHING
NITRIC, HYDROCHLORIC, SULPHURIC, DIPPING ACIDS & SUNDRY CHEMICALS
• PROCESS ENGRAVING
NITRIC ACID, IRON PERCHLORIDE (LIQUID OR SOLID) SUNDRY CHEMICALS
• GARAGES, ETC.
ACCUMULATOR ACIDS (ALL STRENGTHS) DISTILLED WATER
GEO. F. BOOME & SON LTD.
STAR CHEMICAL WORKS
WATTS GROVE, BOW, E.3
PHONE EAST 2264-5

Cresylic Acid
HIGH BOILING TAR ACID
CRESYLIC CREOSOTE
NAPHTHALINE
PYRIDINE
PHENOLS
CRESOLS
MIRVALE CHEMICAL CO. LIMITED
Mirfield. Yorks. Phone Mirfield 2157

PUMPS
FOR ALL PURPOSES
Centrifugal and Diaphragm 1½" to 4" dia.
PETROL, ELECTRIC OR HANDPOWER.
NEW AND RECONDITIONED.
SALE OR HIRE.
RING GREENWICH 3189
THE GREENWICH PUMP & PLANT CO., LTD.
DENHAM ST., GREENWICH S.E.10

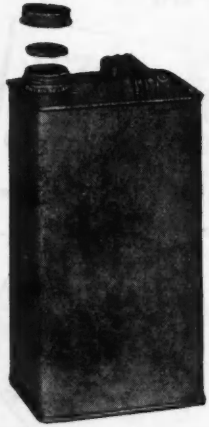


IMPREGNATING VESSEL FOR PRESSURE OR VACUUM
'F.Y.T.' SELF-SEALING QUICK ACTING BOLTLESS DOOR

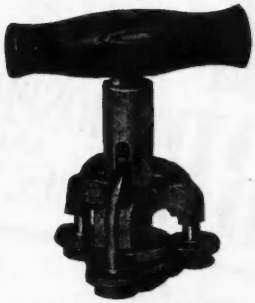
HYDRAULIC EQUIPMENT
HYDRAULIC & POWER PRESSES
CHEMICAL PLANT
RUBBER MACHINERY
WELDED FABRICATION WORK
CLASS "A" PRESSURE VESSELS
SHELL TYPE BOILERS
STEAM RAISING EQUIPMENT

FOSTER YATES & THOM LTD
Heavy Precision Engineers
BLACKBURN ENGLAND

Tins for all Trades Home & Export



Square can showing patent screw neck.
Patent No. 382,380



CAPSULING MACHINE
Patent No. 10699

NECK, PLUGS and CAPSULES
for hermetically sealing cans holding liquids.

SPECIALISTS IN PRESS FITTINGS for all types of Cans and Drums
Contractors to the Admiralty, Ministry of Supply, India Office, Crown Agents for the Colonies etc., etc.

J. F. Farwig & Co
LIMITED Est. 1809

208-214 YORK RD., BATTERSEA, LONDON, S.W.11
Grams: CALORIGEN, BATT, LONDON. Tel: Battersea 7008

The DOWSON & MASON GAS PLANT CO. LTD.

MANCHESTER 19
Tel. No.: Heaton Moor 2261

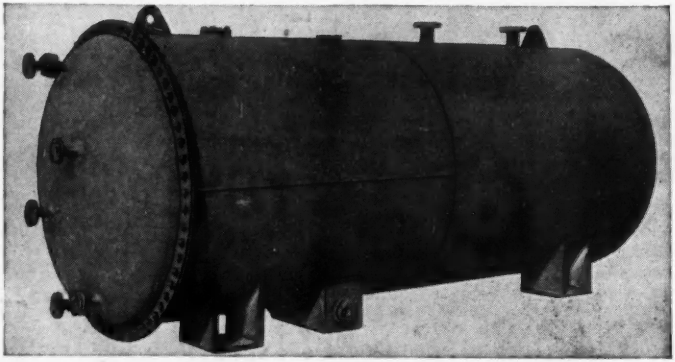


Illustration shews M.S. Rubber Lined Tank for Hydrochloric Acid

TANKS. CYLINDRICAL AND RECTANGULAR
PUMPS AND FLOW METERS, ETC.

FOR CHEMICAL PLANT
specify
'B.B.' PHOSPHOR BRONZE AND COPPER TUBES, SHEET & STRIP

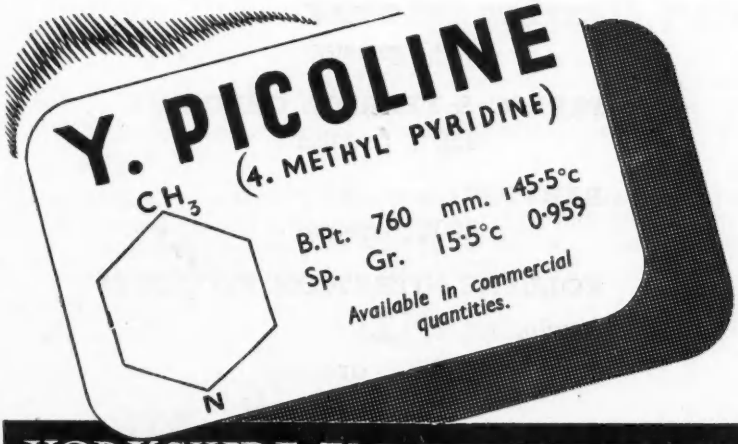
ALSO—
"DONA" Brand
COPPER TUBES and SHEETS to facilitate Copper Welding Operations.

BATTERY BB SYSTEM

THE
BIRMINGHAM BATTERY AND METAL CO. LTD.
SELLY OAK · BIRMINGHAM 29.

INDEX TO ADVERTISERS
IN THIS ISSUE

	Page
Air Conditioning Corporation (Jeffreys) Ltd.	xii
Allen, G. Athole (Stockton) Ltd.	iv
Audley Engineering Co., Ltd.	205
Beechams Group Ltd.	206
Birmingham Battery & Metal Co., Ltd. ...	ii
Blackwells Metallurgical Works Ltd. ...	xxiv
Boome, Geo. F. & Sons Ltd. ...	Cover ii
Boots Pure Drug Co., Ltd.	Front Cover
Braby, Frederick & Co., Ltd.	x
British Steam Specialities Ltd. ...	Cover ii
Callow Rock & Lime Co., Ltd. ...	Cover iii
Chance Bros. Ltd.	xvii
Classified Advertisements	xx, xxi, xxii
Coastwise Petroleum Co.	ix
Commercial X-rays Ltd.	Cover iv
Danks of Netherton Ltd.	Cover iii
"Discovery," Jarrold & Sons Ltd.	xxiv
Dowson & Mason Gas Plant Co., Ltd. ...	ii
Farnell Carbons Ltd.	xxiv
Farwig & Co., Ltd.	i
Foster Yates & Thom Ltd.	i
Foyle, W. G. Ltd.	xxiv
Gascoigne, George H. & Co., Ltd.	xiii
Greenwich Pump & Plant Co., Ltd.	Cover ii
Hackbridge & Hewittic Electric Co., Ltd. ...	xvi
Harris, F. W. & Co., Ltd.	xxiv
Headquarters & General Supply Ltd. ...	210
Imperial Smelting Corporation Ltd. ...	207
Jenkinson, W. G. Ltd.	210
Kent, James Ltd.	Cover iii
Kestner Evaporator & Engineering Co., Ltd.	viii
Kilner, John & Sons (1927) Ltd.	210
Laporte, B. Ltd.	xii
Leeds & Bradford Boiler Co., Ltd.	210
Leitch, J. W. & Co., Ltd.	xxiii
Lennox Foundry Co., Ltd.	xxiv
London Aluminium Co., Ltd., The	v
Lord, John L., Ltd.	Cover iv
May & Baker Ltd.	xix
Meadows, Chas. W. (London) Ltd.	xxiv
Metallurgical Chemists Ltd.	xxiv
Mirvale Chemical Co., Ltd.	Cover ii
Moon Bros. Ltd.	vi
Mullard Measuring Instruments Co., Ltd. ...	xvi
Paterson Engineering Co., Ltd.	xviii
Pulsometer Engineering Co., Ltd., The ...	xviii
Reads Ltd.	xv
Robinson, L. & Co.	xiv
Roneo Ltd. (Neopost) Ltd.	xiv
Shannon Ltd., The	209
Shell Chemicals Ltd.	xi
Spence, Peter & Sons Ltd.	viii
Steel, J. M. & Co., Ltd.	xix
Swift & Co. (Pty.) Ltd.	209
Universal Emulsifiers Ltd.	x
Wallach Bros. Ltd.	209
Ward, Thomas W. Ltd.	vii
Wilkinson, James & Son, Ltd.	xxiii
Yorkshire Tar Distillers Ltd.	iii



YORKSHIRE TAR DISTILLERS LTD
CLECKHEATON, YORKS.
TEL. CLECKHEATON 790 (5 LINES)
TELEGRAMS TO-YOTAR CLECKHEATON

ATHOLE G. ALLEN (Stockton) LTD.

STOCKTON-ON-TEES,

CO. DURHAM

Telephone :
STOCKTON 6375 (3 lines)

Telegrams :
Chemicals, Stockton-on-Tees

Compared with Pre-War
our **PRODUCTIONS** now are :—

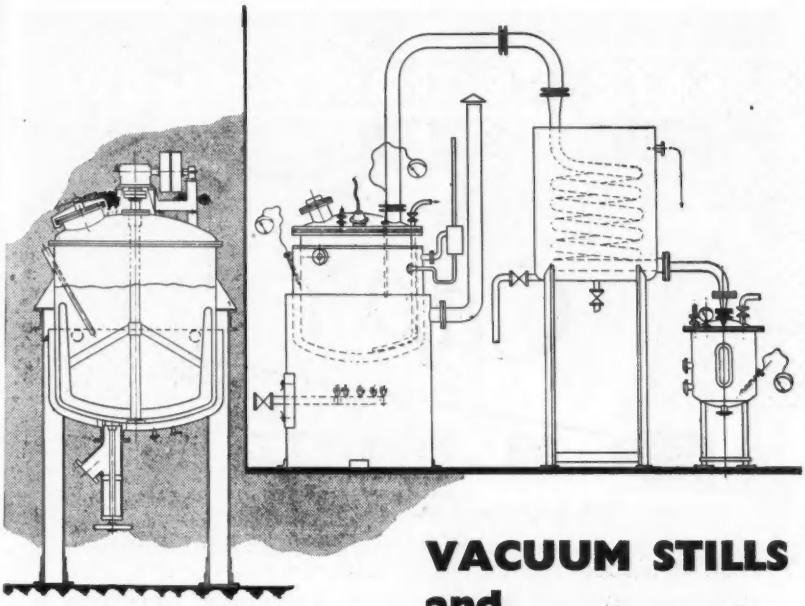
BARIUM CHLORIDE
600% greater

FERRIC & FERROUS CHLORIDE
150% greater

BARYTES
400% greater

TOLUENE NITRATION PRODUCTS
(excluding T.N.T.)
1100% greater

and we are
NOT MEMBERS OF ANY TRADE ORGANISATION



VACUUM STILLS and JACKETED PANS

FOR REACTION OF PRODUCTS or distillation under vacuum the plant illustrated above (*right*) gives excellent results. Up-to-date design, economical first cost and maintenance. Sizes 25 to 100 gallons capacity.

FOR MIXING AND DRYING OPERATIONS we design many types of Jacketed Pans, including that illustrated (*left*) with agitator. Heating systems may be steam, hot water, oil or diphenyl, according to design and applications. Capacity : 50 to 1,000 gallons.

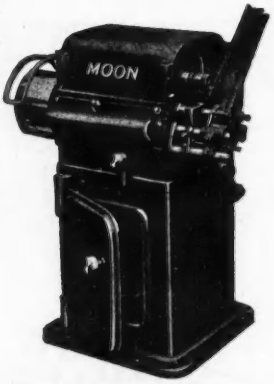
We fabricate in Stainless Steel, Copper or Aluminium, etc.

Write for leaflets
V.J.P. 14/16.

DIAMOND Industrial PLANT
FOR FERROUS & NON-FERROUS METALS

THE LONDON ALUMINIUM CO LTD
HEAD OFFICE & WORKS: WESTWOOD ROAD, WITTON, BIRMINGHAM 6.

Just screw caps or screwed, knurled, nibbed and curled? However you require them you need never be short of supples if you install a machine such as this. One of the 200 odd "specials" made by MOON, it is capable of a variety of operations on cylindrical drawn shells—and it works fast! In closure and container queries, you should consult us.



MOON

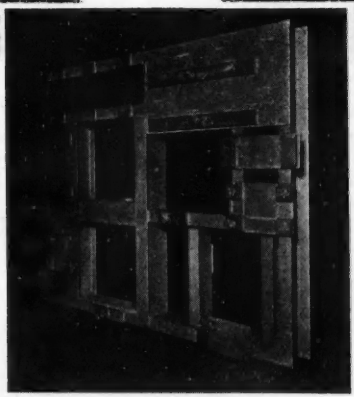
MOON BROTHERS LTD. - BEAUFORT ROAD - BIRKENHEAD

MAKERS OF TIN BOX AND DRUM MAKING MACHINERY

Telephone: Birkenhead 1527 Telegrams 'Moonbro', Birkenhead

dmMBI

FABRICATION IN STEEL



No fabrication problem comes amiss to WIDNES CONSTRUCTIONAL DEPARTMENT. The same skilled hands and flexible organisation which turned to the building of Bailey Bridges and Mulberry Harbour are now once again producing Storage Tanks, Condensers, Coolers, Girder Assemblies, Frames and the like.

Developed in logical parallel with the production of special-purpose castings, fabrication in steel makes still more comprehensive the engineering service offered by the WIDNES organisation.

Specialists in the production of Cast and Fabricated vessels and equipment in cast iron, mild and stainless steels for the chemical, oil, food and allied industries.

The photograph above shows a fabricated crab frame for a 15-ton overhead travelling crane all welded construction.

WIDNES FOUNDRY & ENGINEERING CO. LTD

TELEPHONE WIDNES 2215 (4 LINES) TELEGRAMS 'FOUNDRY' WIDNES

LUGSDALE ROAD · WIDNES · LANCS

London Office: BRETTENHAM HOUSE, LANCASTER PLACE, STRAND, W.C.2.

Heavy Chemicals and Pharmaceutical Specialities

SPENCE CHEMICALS are backed by over 100 years of experience. Aluminous compounds are the chief products, but titanium salts, silicas and special pharmaceutical chemicals are also manufactured.

A booklet giving an abridged range of SPENCE chemicals will gladly be sent on request.

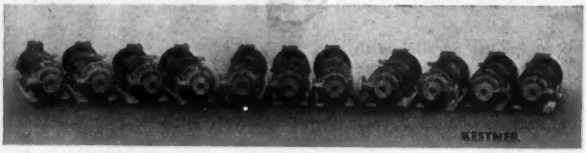
PETER SPENCE & SONS LTD

National Buildings, Manchester 3

London · Widnes · Goole · Bristol

R.P. 1868A

A NEW ACID PUMP
GLANDLESS—SELF-PRIMING



PATENT GLANDLESS ACID PUMPS

- NO PACKING GLAND
- NO BEARING SURFACE IN CONTACT WITH ACID
- MADE IN SPECIAL MATERIALS RESISTANT TO ALL CORROSIVE LIQUIDS
- LONG AND TROUBLE-FREE LIFE ASSURED
- SELF-STARTING EVEN AFTER A LONG SHUT-DOWN.

Full Particulars from:

KESTNER'S

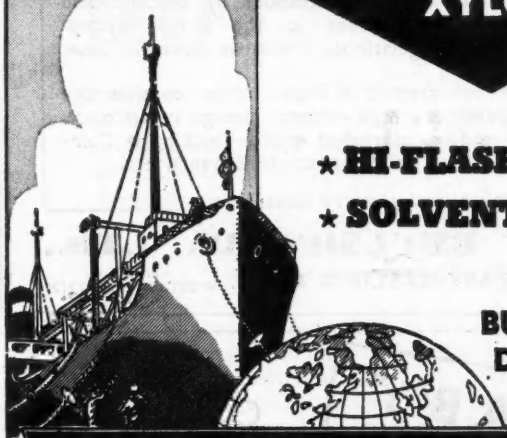
Chemical Engineers 5, GROSVENOR GARDENS, LONDON, S.W.1

Over 25 Years of Dependable Service!

BENZOL
TOLUOL
XYLOL

★ HI-FLASH NAPTHA
★ SOLVENT NAPTHA

BULK OR DRUMS



The COASTWISE PETROLEUM Co.

Munsey Bldg.
Baltimore 2, Md., U. S. A.

WORKS AND TERMINAL
GOODHOPE
(New Orleans) La., U.S.A.

Enquiries Invited!

SEND FOR SPECIFICATION BOOK

European Representatives:

SIMPSON, SPENCE & YOUNG
28 SAINT MARY AXE.
LONDON, E. C., 3, ENGLAND
Telephone: AVENUE 3921
Telegrams: FALLODEN

UNEMUL

(INERT ALUMINA GEL)

FOR EMULSIFYING AND SUSPENDING

INORGANIC · EDIBLE · VERSATILE

THE AGENT — Chemical inert ● Unattacked by bacteria and fungi ● Non-injurious to the human system A smoothly gelatinous cream or ointment base.

THE EMULSIONS — Easy to prepare ● Stable over considerable temperature range without change in viscosity. pH readily controlled ● Non-frothing ● Compatible with solids, dyestuffs, binders, etc.

AVAILABLE IN ANY QUANTITY IMMEDIATELY

UNIVERSAL EMULSIFIERS, LTD.,

INVICTOR WORKS, EAST MALLING, KENT. 'PHONE: WEST MALLING 2139

Our factory at Liverpool is designed and equipped for the production of high grade steel drums of many types, which can be supplied Painted, Galvanized, Tinned or Lacquer lined.

Certain types can also be made from Stainless Steel.

FREDK. BRABY & CO. LTD.,

LIVERPOOL : Havelock Works, Aintree, Liverpool 10. Tel.: Aintree 1721.
LONDON : Head Office, Fitzroy Works, 352-364 Euston Road, N.W.1. Tel.: Euston 3456.
EXPORT : 110 Cannon Street, London, E.C.4. Tel: Mansion House 6034.
Also at
DEPTFORD - GLASGOW - BRISTOL
BELFAST and PLYMOUTH

Chemicals from petroleum

TEEPOL

A most versatile chemical derived from petroleum is TEEPOL—a surface active agent highly efficient in reducing both surface and interfacial tensions and important in many processes involving wetting, penetration, dispersion and detergency.

Chemically TEEPOL is based on sodium higher alkyl sulphates and is marketed as a clear amber-coloured liquid. TEEPOL is soluble in water of any degree of hardness to give clear neutral solutions which do not hydrolyse and which are stable over a wide range of pH values.

TEEPOL is effective, even at very low concentrations, in acid, alkaline or neutral solutions. The calcium and magnesium salts of TEEPOL are themselves readily soluble in water and, consequently, solutions of TEEPOL are no less satisfactory in hard than in soft water. TEEPOL is now being made on a large scale in this country and supplies are free and unrestricted.

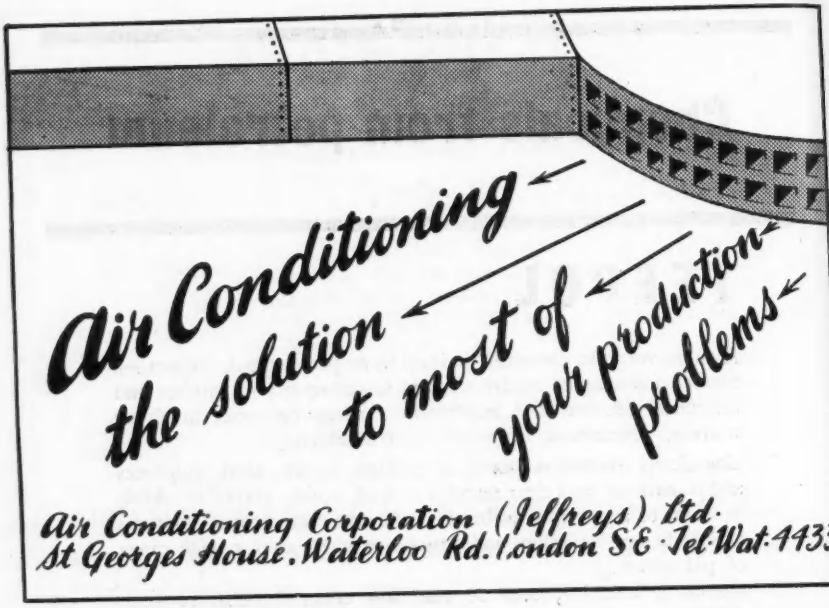
In the Chemical Industry

The detergent properties of TEEPOL are of great value in the cleansing of chemical plant and equipment. The efficiency of TEEPOL is not impaired by the presence of acid, alkali or quite high concentrations of electrolytes and being readily soluble in water it is easily rinsed away after the cleaning operations. Floors, walls and ceilings of chemical factories can be kept spotlessly clean by the regular use of TEEPOL which effectively reduces dust, particularly from concrete floors, a factor of vital importance in the manufacture of fine chemicals and medicinals. In the laboratory, TEEPOL facilitates the removal of obstinate tenacious materials and leaves chemical glassware spotlessly clean. Fuller particulars are available from :—

SHELL CHEMICALS LIMITED
(DISTRIBUTORS)

SHELL

HEAD OFFICE: 112 STRAND, LONDON, W.C.2. 'PHONE: TEMPLE BAR 4455
MANCHESTER BRANCH: 4 ST. MARY'S PARSONAGE, MANCHESTER, 3



HYDROGEN PEROXIDE
All grades and concentrations

PEROXYGEN COMPOUNDS, including
SODIUM PERCARBONATE · MAGNESIUM
PEROXIDE · ZINC PEROXIDE · UREA
HYDROGEN PEROXIDE · AMMONIUM,
SODIUM AND POTASSIUM PERSULPHATES
BENZOYL PEROXIDE

BARIUM COMPOUNDS

SODIUM SULPHIDES · SODIUM ACID
PHOSPHATES · SODIUM HYPOCHLORITE
METALLIC SOAPS · SULPHATED FATTY
ALCOHOLS · SODIUM METASILICATE
ALKALINE CLEANERS

Chemicals
INDUSTRIAL
AND FINE

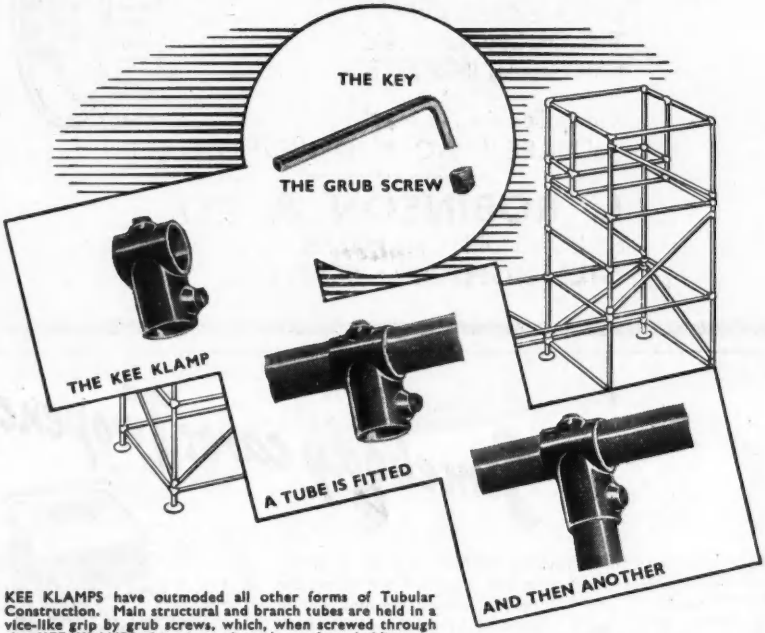
CROSSED KEYS BRAND

LAPORTE
B. LAPORTE Ltd. LUTON Phone: LUTON 4390 Grams: Laporte Luton

RAPID ERECTION WITH KEE KLAMPS

BEFORE YOU CAN SAY

J·A·C·K R·O·B·I·N·S·O·N



KEE KLAMPS have outmoded all other forms of Tubular Construction. Main structural and branch tubes are held in a vice-like grip by grub screws, which, when screwed through the KEE KLAMPS, bite into the tube surface, holding the structure rigid. *The vertical load carried by one grub screw approaches two tons.* KEE KLAMPS make full use of the tube as structural material. They simplify erection on site by unskilled labour. Structures can be rapidly erected, extended or modified, and can be quickly dismantled.

KEE KLAMPS will joint all forms of Tubular Construction from Hand Rails to Hangars, from Racks to Repair Platforms, from Sheds to Staging, from Tables to Towers and, Sir, that very structure you had in mind. We invite you to send us your constructional problems.

GASCOIGNES

Makers and Patentees of the exclusive

KEE KLAMPS

The GEO. H. GASCOIGNE CO. LTD. (Dept. 3b), BERKELEY AVE., READING. *'Phone 4831-2-3*

There's nothing like a

"JUBILEE"

to ensure
perfect
satisfaction

•

USED EXTENSIVELY
THROUGHOUT THE
CHEMICAL INDUSTRY

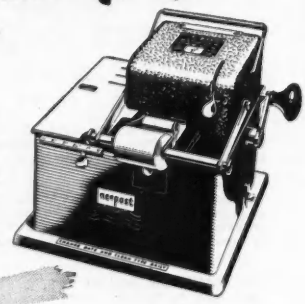
•

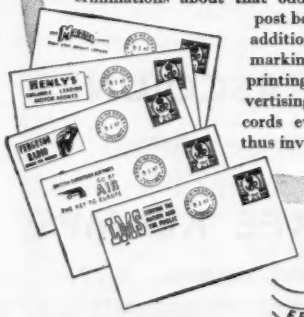
Remember the Name—
"JUBILEE" WORM DRIVE HOSE CLIPS

L. ROBINSON & CO.
6, LONDON CHAMBERS,
GILLINGHAM · KENT

Somebody cares Twopence

The NEOPOST Franking Machine disposes of all recriminations about that odd twopence for which the post book cannot account. For, in addition to franking and postmarking all outgoing letters and printing on them any desired advertising slogan, it faithfully records every item of expenditure thus involved.





neopost FRANKING MACHINES

FRANKING MACHINES

Full particulars from
RONEO NEOPOST LTD., Victoria House, Southampton Row, London, W.C.1. *Telephone:* Holborn 4933.
Branches throughout the country. T.B.W.

Too many varieties perhaps

...but

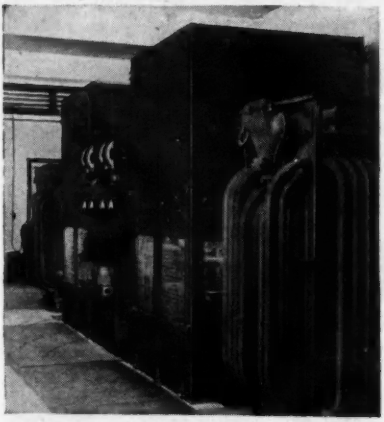
VARIETY SPEEDS DELIVERY. *Where our order book is full for some time to come on a particular type of package, we can often offer an alternative design to assist you.*

Although sometimes we feel that we have tooled up for too great a variety of tins, cans, kegs and drums during the past three-quarters of a century, on many occasions this unique range has proved of great service to many of our customers with urgent packaging problems. Despite this, we are always willing to consider the immediate manufacture of new tools for new designs of packages. Our artists will also be pleased to prepare original sketches and finished drawings, if you desire, for tins and drums to be lithographed.

R2082/1—C1

READS LTD., ORRELL HOUSE, ORRELL LANE, WALTON, LIVERPOOL 9 AINTREE 3600
AND 227 GRAND BUILDINGS, TRAFALGAR SQUARE, LONDON, W.C.2 WHI 8781
ALSO AT GLASGOW, BELFAST AND CORK

Converting A.C. to D.C.



Typical Hewittic Rectifier supplying D.C. for industrial drives

for INDUSTRIAL APPLICATIONS

THE problem of providing a D.C. supply—for the operation of electrolytic plant, electric locomotives and trucks, cranes, hoists and variable speed D.C. drives, lifting magnets, magnetic clutches and separating plant, for small scale or bulk charging of batteries for electric vehicles, etc.—for almost every application where D.C. is required—is most effectively solved by installation of a HEWITTIC Rectifier, **the simplest, most reliable converting plant made.**

This equipment operates at high efficiency with correspondingly ***low running costs,*** requires negligible maintenance, operates completely ***unattended,*** is easily installed in existing buildings and awkward sites without special foundations or the need for crane facilities.

Hewittic floor-mounting battery charger for electric vehicle-operation

Hewittic Rectifiers

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD.
WALTON-ON-THAMES, SURREY.
Telephone : Walton-on-Thames 760 (8 lines)
Telegrams : "Electric. Walton-on-Thames"

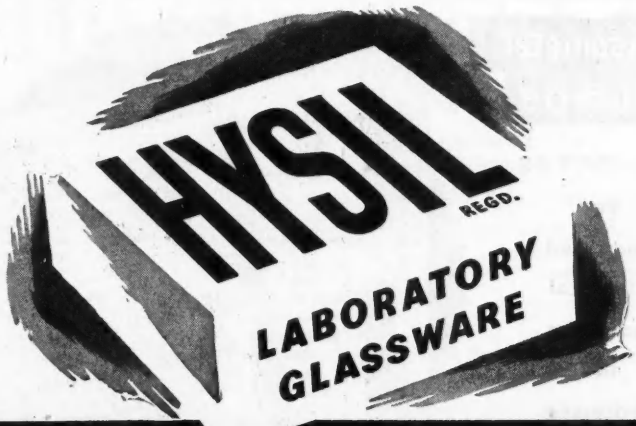
MEASUREMENT BY Mullard

● The conductivity of liquids can be rapidly and precisely determined by means of the Mullard Universal Measuring Bridge and Conductivity Cell. New type cells, protected against external corrosion, are available and a 1000 c/s. oscillator can be supplied if required. Send for illustrated leaflet MC. 592.

THE MULLARD WIRELESS SERVICE CO., LTD.
(Measuring Apparatus Section)
CENTURY HOUSE, SHAFTESBURY AVE., W.C.2.

Mullard

(ML.199)



NOW IN STANDARD CASES AT *Special Discounts*

From July 1st onwards, the most popular items and sizes of Chance Brothers' 'Hysil' Laboratory Glassware will be available in Standard Cases. Furnishers and Users will find that this new arrangement greatly simplifies the ordering, handling and stocking of 'Hysil'.

EXAMPLE CASES

Tall Beakers, 600 ml.	*60*
Squat Beakers, 250 ml.	*84*
Flat-bottom Flasks, 500 ml.	*72*
Distillation Flasks, 1,000 ml.	*12*
Round-bottom Flasks, 5,000 ml. ...	*6*

A new price list of 'Hysil' Laboratory Glassware is now available and will be sent on request. All popular items and sizes are specially indicated and by confining their orders to these sizes Furnishers and Users will obtain quicker delivery than if their orders include items which are not in such general demand.

DISCOUNTS

NUMBER OF CASES	
1 to 9	*10%*
10 to 19	*10 & 2½%*
20 to 29	*10 & 5%*
30 to 39	*10 & 7½%*
40 and over	*10 & 10%*

CHANCE BROTHERS LIMITED

GLASS WORKS, SMETHWICK, 40. Nr. BIRMINGHAM

Tel: West Bromwich 1051

London Office: 28 St. James's Sq., S.W.1. Tel: Whitehall 1603

A *Chance* PRODUCT

Pulsometer Pumps

ALL DUTIES

For

Food and

Chemical

Industries

and

Processes

LIST No. 3086

Rotary or Reciprocating
VACUUM PUMPS
for
Factory or Laboratory
All Sizes & Types
for
High Vacua
Displacement
Dessication
Distillation
Moist Air
Circuits
PULSOMETER-DOULTON STONEWARE PUMP
Acid - Proof
Non-Porous
Will handle most hot or cold corrosive liquids without injury to the pump. Free from gland trouble.
CENTRIFUGAL PUMPS
made of
Stoneware and Special Metals
In all sizes for Food and Chemical Industries and Processes.
Special Metal Pumps are made of special corrosion resisting materials adapted to the particular chemical required to be pumped.

Pulsometer Engineering C° L°
Nine Elms Iron Works Reading

PATERSON DRY CHEMICAL FEEDER

Extensively used for the application of

POWDERED REAGENTS

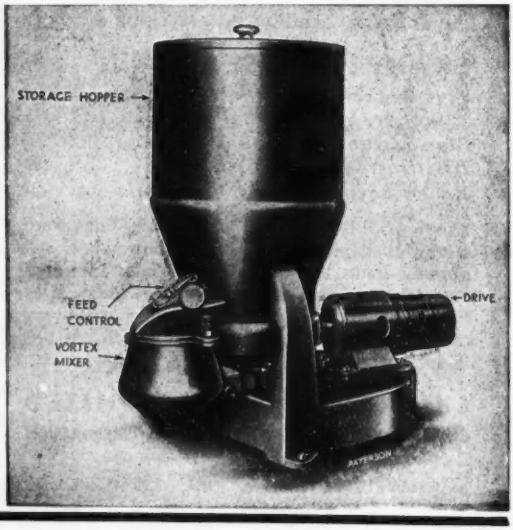
for Water Treatment purposes and for measuring and proportioning powdered or Granular Substances.

●

Technical details from

PATERSON ENGINEERING CO., Limited

83, KINGSWAY, LONDON



The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON Telephone CENTRAL 3212 (12 lines)

SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3970)

MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited

VOL. LVII No. 1465. 9 August 1947 Annual Subscription 26s 8d. per copy; post free, 10d.

A National Stocktaking

THE late Lord Bennett, ex-Prime Minister of Canada, said in one of his last public utterances: "Every generation has great problems to solve, and this country has led the way in solving most of the great problems that the world has had to meet. It is not too much to say that you are still doing so. You may lack something of the vigour and greatness of the past, because the world has become more settled than it was even twenty-five years ago; man has made progress, and the difficulties of solving the problems that now arise are greater than they used to be; but you are showing a capacity to deal with them, and that is all that can be asked."

These words, from a great Empire statesman who had come to spend his retirement among us, are heartening. In a large measure they are deserved. We certainly have not evaded the great problems of the world to-day. Political problems are being dealt with in a new way. There are conflicting views as to whether it is a wise way, but in foreign policy at least we are leading in a direction in which it is clear that the world will go within the next few decades. The department in which we have rather less ground for confidence is that of the solution of our own economic problems. This doubt is increased by a series of papers on economic reconstruction promoted by the Royal Society of Arts last session.

Conditions, as Lord Bennett said, have changed profoundly, and the world is far more complex than it was when Britain's industrial and economic fortunes were founded. One outstanding change is in the mechanical energy available to producers. Less manual work is required to-day than ever before, but quite as much, perhaps far more, energy is required to cope with modern requirements. Britain is an under-nourished nation. Many attempts have been made to disprove this, but the disclaimers do not accord with the general experience. Those fortunate enough to travel abroad return with tales of lands flowing with milk and honey; but, we are told, "the flowers are not for you to pick."

From the Society of Arts discussion it stands out clearly that this under-nourished country is finding it difficult after the strain of two of the most devastating wars in history to raise the energy to recover its fortunes. Many of the present industrial and labour difficulties arise from the fact that we are out of condition. Our people are listless, and demand more leisure than their work entitles. The five-day week for the mines was widely acclaimed, but its effect has been a reduction of output at a time when increased output was essential, and so the whole system has again to be reviewed.

The depreciation of money values is another change to which we have yet to become accustomed. One hundred years ago, Sir Robert Peel declared: "I have good reason for thinking that one of my police constables, if a single man, can find out of his pay of a guinea a week: (1) lodgings, (2) medical attendance, (3) very comfortable subsistence at his mess, (4) clothing, and can, after finding these, save out of his pay ten shillings a week." To-day, a man who earns £10 a week can get only about the equivalent of a £3 pre-war wage with it. The low purchasing

On Other Pages

Leader:
A National Stocktaking ... 179
Notes and Comments:
Odd Olfactories 181
Characteristic Smells 181
Dangerous Familiarity ... 181
Technical Universities 182
Staggering Difficulties 182
1938 *Values Doubled* 183
Atomic Progress Too Slow ... 185
Chemists' Responsibilities 184
Institute of Metals 186
Silicon Organic Compounds—I ... 187
Improvements in Powder Metallurgy 192
American Chemical Notebook ... 193
Iron in Industrial Waters—II ... 195
Nitrate Hazards under Review ... 1997
South African Chemical Notes ... 198
Vinyl Esters 199
Ultra-Rapid Plating 199
Home News Items 200
Technical Literature 200
Personal 201
Electron Microscopy Conference ... 201
U.S. Fertiliser Exports 201
A Chemist's Bookshelf 202
Overseas News Items 203
Parliamentary Topics 204
Magnesia Refractory Materials ... 204
Dwindling Oil Output 204

power of money is at the root of quite a lot of our troubles to-day. As a consequence wages are chasing prices on a rising spiral and our costs of production threaten to reach a level so high as will reduce our export trade far below the subsistence level.

Tiredness, lack of enthusiasm, downright disillusionment are sapping our will to fight back; added to this the frustration caused by over-control has produced a new desire shown in willingness to emigrate. (According to a Gallup poll, 40 per cent of British people favour emigration.) The old system cannot be condemned out of hand because it permitted unemployment. Unemployment was then a world problem due to a form of mal-distribution of goods and effort. Then we were in the grip of a vicious circle. To-day we are again chasing our own tails, but this time there is plenty of work to be done, and therefore *for the time being* there is little unemployment. There is now a dead level of scarcity.

We say *for the time being* deliberately. Mr. A. C. Bossom, M.P., has pointed out to the Royal Society of Arts that it was to help us to " buy time " at this vital stage, that the U.S.A. had loaned us $3750 million. This so far has been spent with a not too cautious hand, and by autumn more than three-quarters will be gone. We shall then not be even halfway to regaining a self-sustaining position, and the possibility of national bankruptcy is to-day being recognised even in Cabinet circles. Meanwhile, austerity production, to which we have been committed, trains men to make austerity goods, but fails to prepare them to make better or craftsmen's articles. It is generally true that many of our competitors in the export markets are going ahead faster than we are, especially in enhancing quality. The evident danger is that we shall not even maintain our position in the overseas markets. The Bretton Woods agreement is held by many to be a further handicap when it comes into force.

News from Government sources this week shows there is before us a period of severe difficulty, of further belt-tightening, of reduced standards of living, and the possibility of widespread unemployment if we do not change our ways. Over-taxation and over-control (as Mr. Bossom says), have brought an end to other empires. This, then, is a period in our history at least as grave as 1929, and, as then, a time when it can reasonably be expected that all men of good will of all political parties will pull together. It is the time for restoring the National Government.

It is too early to comment on the new Bill published by the Government at the beginning of this week, under which they propose to take wider powers over industry, commerce and agriculture. This Bill will empower Ministers to put into effect the proposals announced by Mr. Attlee on Wednesday. Whether these proposals will have the effect intended, or whether they will further add to the frustrations of industry remains to be seen. Whatever the effect may be, the Government's action is in the nature of a desperate last-wicket stand.

NOTES AND COMMENTS

Odd Olfactories

IN our issue last week reference was made to the Home Office leaflet on "Fumigation with Methyl Bromide." In the leaflet is mentioned the fact that "the smell of the gas is so faint that many people cannot smell it even when definitely harmful concentrations are present." The leaflet adds that people coming into frequent contact with the gas may lose what powers of detection they previously possessed. This interesting note on the lack of perception of odour by some people should call attention to the shortcomings of the nasal organs of many people. Although in this report it mentions the faint smell which cannot be detected by some of is, it is a fact that comparatively strong odours are sometimes not detected by a large percentage of people. Recent correspondence in a contemporary has drawn attention to the insensitivity of some individuals to the odour of prussic acid. In one instance where eleven people were given a quick test, no less than five were not conscious of a smell when they sniffed at a potassium cyanide bottle. The other six reported a distinct odour of bitter almonds. Other investigators reported a ratio of about three non-smellers to five smellers, there being little difference between males and females. It is not known, nowever, if frequent contact with HCN gas promotes insensitivity of smell as is the case with methyl bromide. One interesting point mentioned was that a German professor used to advise his students to smoke a cigar while working in the laboratory, as by this means the presence of free cyanogen was instantly detectable.

Characteristic Smells

THE question of chemicals and their characteristic smell is one which has been taken too much for granted. Textbooks tell us, for instance, of the bitter almonds smell of hydrogen cyanide. But this, one of the first tests to be carried out, as it involves no setting up of apparatus—would fail three people in eight; and how many chemists cannot smell H_2S or SO_2, we wonder. How many more by frequent contact with these gases in college laboratories have since lost their sense of smell for these gases? This failure to register smell may, we think, be classed with the failure of other senses to register when we become "acclimatised" or "used" to something. We can, for instance, get accustomed to noise, warmth, discomfort and a dozen other unpleasant things. It may be that we can get "accustomed" to a certain smell and fail to notice it, *i.e.*, if we were some of the lucky (*sic*) ones who could smell it in the first place.

Dangerous Familiarity

AMMONIUM nitrate, like a host of other chemicals, has long been regarded as innocuous as coal or any other industrial material. And like coal in the mines it is capable of exacting a fearful penalty when incautious handling and the untimely spark occur together. The distinction between common fertiliser materials and high explosives is finer than is commonly recognised. Gross risks are taken daily, usually with impunity, with familiar substances—then one day the volcano erupts. It erupted once in 1921 in Oppau in Germany and half a town went down in ruins. A great dump of nitrate, exposed to wind and weather, had solidified and to disintegrate it explosive charges and detonators were drilled into it . . . and fired. Had the material been T.N.T. the devastation could not have been more complete. In the port of Texas City in April this year a fire, the cause of which was never definitely established, reached the laden hold of the nitrate ship *Grand Camp*. The trail of fire and explosions which followed destroyed much of Texas City, most of the Monsanto Chemical Works and cost some 600 lives. In Brest last week ammonium nitrate in the American ship *Ocean Liberty* added to its toll 21 lives and an area of wreckage which has been compared with the effects of a heavy bomber attack. In the light of these facts, the necessity of applying to ammonium nitrate and to some of its equivalents the safeguards of life and property required in the handling of other unreliable materials in bulk concentrations cannot longer be evaded. Because there has as yet fortunately been no major mishap in the shipment or processing of nitrate in this country, the belief that "It can't happen here" seems to have conditioned such regulations as are in force.

In most of them nitrate, as such, is not mentioned and its inclusion depends upon the interpretation of the description "any substance which may be explosive." Some of the several authorities concerned with industrial and maritime safeguards are now studying the variously derived nitrates in the light of the recent calamities. It is sincerely to be hoped that they will take a chemist's view of their subject, and recognise that ammonium nitrate (like cordite or petroleum) is a harmless and useful material so long as elementary safeguards are enforced—and a potential destroyer if they are not.

"Technical Universities"

THE Parliamentary and Scientific Committee, which comprises representatives of 70 scientific organisations, some 200 M.P.s and peers of all parties, has just adopted a report which, if fully implemented, will profoundly improve the status and extend the scope of technical colleges and go far towards closing the gap which exists between demand and supply of technologists for industry. The findings of the special sub-committee, on which chemical industry is well represented, have now been submitted to the Minister of Education with, apparently, good prospects of acceptance, since the general trend of the proposals accords closely with expressed policy of the Ministry. The need for the greatest possible aid being given now to the technical colleges was indirectly underlined in the same committee's report last December on the rôle of universities in providing scientific manpower, which indicated that university facilities were already being strained to the limit, and academic scientists cannot, in any case, immediately adapt themselves to technological problems. The committee further points out that the study of selected branches of technology is a problem which cannot be solved by devoting to it a post-graduate year (as has been suggested in the past) and recommends that tuition in those branches, together with the appropriate basic scientific foundation, must be the function of technical colleges with greatly extended resources and should lead to the award of a degree which will attract men and women of high ability. These recommendations clearly indicate a fundamental departure from long established academic traditions and manifestly will require the closest possible safeguards to ensure that the value of our academic coinage is not debased, as it has been in some other countries. It is reassuring to note that the committee is unanimously agreed on the need of vigilance in this regard, although it has yet to determine to what extent it is desirable to differentiate the title of a specialist technological award from the bachelorship, mastership or doctorate, conferred by the universities. These, however, are subsidiary issues to the principal result, which is that an influential body is wholeheartedly backing better and fuller opportunities for providing highly trained technicians, who are one of industry's greatest needs at the present time.

Staggering Difficulties

THE scheme for the staggering of hours which is to come into effect on October 1 and which may form part of the Government's panic measures to deal with the economic crisis—a crisis we have been warning our readers about for the past 18 months—is coming up against many unforeseen difficulties. One of these has been brought to our attention this week. It is that young men and women, who are studying in their spare time for science degrees, may find that their hours of leisure under the staggered scheme, do not coincide with the hours of lectures at their colleges or institutes, and that even their hours of practical work in laboratories may have to be reduced. The fact is that the staffs and facilities of all science instructing institutions have been so stretched already that it is impossible to extend the present number of lecture hours and laboratory hours without first finding extra staff, and perhaps accommodation. This problem of further education and training for would-be chemists who may have to stagger their hours is proving a headache to many heads of institutes and colleges. Full-time students are not affected—it is only those who may have to work at times when normally they would be at lectures or in the laboratories. We think the Government and employers must relax the conditions in the case of young men and women who have or are going to enrol for further training and education in their spare time. If they do not relax them, then the present shortage of scientists will be accentuated.

Atomic Progress Too Slow

Official Inquiry Sought

THE progress of the Government's first atomic energy plant, at Harwell, Berks., has been unreasonably delayed and the public is not being given sufficient information about it. This is the conclusion of the Select Committee on Estimates revealed in a report published on Tuesday, which recommends that an inquiry should be held immediately. In response to the committee's recommendation that as much information about the plant should be published as is consistent with security, the Ministry of Supply has appended to the report a note which states that it is hoped to put the first atomic pile into operation late this year. The pile consists of "several hundred tons of very pure graphite into which is inserted several tons of uranium metal."

Polish Chemical Industry Production in 1946

THE output of the leading products of the Polish chemical industry in April, 1947, was as follows, the figures in parenthesis (where given) being those for April, 1946 :—

Tar products, 14,680 tons (5142); benzol products, 2157 (5800); carbon electrodes, 413; explosives, 870; organic dyestuffs, 156 (104); oil paints and varnishes, 209 (652); zinc blende, 663; ultramarine, 34; pure acetic acid, 27; nitrate fertilisers, 8718 (32,237); superphosphates, 11,465; oxygen (in thousands cu. m.), 290 (311); sulphuric acid, 2782 (16,146); hydrochloric acid, 327; ammonia, 522 (15); acetylene, 2073 (76); ammoniacal soda, 7390 (7902); caustic soda, 2260 (948); soap, 400 (1079).

World's Oldest Company

Thought to be the oldest commercial undertaking in the world, the Stora Kopparbergs Bergslags in central Sweden was the subject of an interesting study in the *Anglo-Swedish Review*, which recalls that when the company—now one of the leading producers of iron, electricity and forest products—received its first charter in 1347 it was already old established. The earliest document relating to the undertaking's activities producing copper from the Falun mine is dated 1288.

Geological Survey.—The Zinc Corporation, it is reported, is to carry out a geological and geophysical survey of a 2790 acre tract of territory adjacent to the lead-zinc leases acquired by Mount Isa Mines in Queensland.

1938 Values Doubled

Records of Chemical and Metal Prices

FURTHER evidence of the continued rise in world prices of chemicals, non-ferrous metals and most other basic goods to more than double the values obtaining in 1938 is provided by the current Board of Trade summary of import and export totals in the first and second quarters of this year and the last quarter of 1946. The declared value of our imports of chemicals, drugs, dyes and colours in the second quarter of 1947 was £6,880,000; expressed in 1938 values, the total value would have been £3,328,000. Equivalent comparisons in other departments of industry were: Non-ferrous metals and manufactures, 1st quarter 1947, £19,229,000 (1938, £8,404,000); manufactured oils, fats and resins, £18,809,000 (1938, £9,423,000). The upward trend showed a further strong movement in the second quarter of this year, as revealed by the index numbers of average values of most manufactures, regarding 1938 values as 100. Imported non-ferrous metals, for example, on this basis were rated 164 in the last quarter of 1946 and rose to 229 in the first quarter of 1947. A noteworthy exception, however, was the index number of foreign chemicals and allied products, which at the end of last year had reached 231, dropped to 217 in the first quarter of this year and to 207 in the second quarter.

British Goods Still Appreciating

A similar comparison of U.K. exports reveals generally a continued rise in our export values. The index number of chemicals, etc., was rated 196 in the last quarter of 1946, 197 in the first quarter of this year, and 216 in the second quarter. Equivalent figures for British non-ferrous metals were 160, 167 and 186; the continued increase in values of oils, fats and resins was equally marked.

Far less satisfactory is the reduced volume of U.K. exports since the end of 1946 when the total was equivalent to an index number of 111. In the first quarter of this year it was 101 and in the second quarter 102. The corresponding figures for chemicals, drugs, dyes and colours were 161, 139 and 131 and for non-ferrous metals and manufactures 194, 164 and 166.

Soviet Seize Anglo-U.S. Refinery.—The seizure by the Soviet authorities at Lobau of the largest oil refinery in Austria which is jointly owned by the British Shell Company and the Sacconi Vacuum Company of New York is reported from Vienna. The refinery, it is stated, was taken over by an armed party without reference to the Austrian Treaty Commission.

CHEMISTS' RESPONSIBILITIES

MASTER OF BALLIOL'S REMINDER AT S.C.I. DINNER

A VISION of chemists occupying in the not distant future a position of authority in world society equivalent to that of the Church in the Middle Ages was presented in convincing terms to the Society of Chemical Industry at the annual dinner at the Connaught Rooms, London, W.C.2, last week. The speaker was the Master of Balliol (Lord Lindsay of Birker), the principal guest among a company of 187 presided over by Dr. L. H. Lampitt, president of the society. The company included two past presidents, Drs. Herbert Levinstein and William Cullen, the society's 1947 medallist Dr. R. T. Colgate, and the Jubilee Memorial lecturers, Mr. J. Curtis (U.S.A.) and Mr. H. W. Cremer.

Internationalism of Science

The Master of Balliol, proposing the toast of "The Society of Chemical Industry," with which he coupled the name of Dr. Leslie Lampitt, promised to avoid the familiar opening gambit of wondering aloud for the space of quarter of an hour why he had been chosen to speak. He bore in mind that it had been said of one of his predecessors at Balliol that "He had like to have been preferred by Queen Elizabeth had not his prolixity interfered with public business." He knew very well, he said, that he had been chosen to speak because he was not a scientist. In the prehistoric age when he went to school in Glasgow you did not do science unless you were a very odd fellow. So he had been accustomed to think of industrial chemists as men who used to do extraordinary things with coal—when there was coal to do it with. But, although he knew no science at all, he had become increasingly aware of science. When he first went to Balliol all the smells from the old laboratory were directly beneath the dining hall, so that one was very well aware of the existence of science there.

At the present, he had a great concern for scientists, and especially for those who had lately been associated with the international meetings of scientists. He invited them to think about the international meetings of scientists. He invited them to think about the international aspects of science and the fact that at a time when nationalism had been getting worse and there were more and more causes for division in the world there had continued to flourish the Utopian flower of international science.

This internationalism was a wonderful thing and had flourished in science more than in any other of the arts. Even philosophy had not the international language that science provided. He had noticed in the last 20 years that this thing was growing stronger and stronger. He had also noticed the other day in *Pravda* or *Izvestia* —" or one of those beastly things "—that secrecy was being enjoined on Russian scientists. Those journals had discovered science—and were frightened of it.

He believed that in the 20th Century science had won its battles by becoming a neutral, and because it was neutral had been allowed to do all kinds of things other people were not allowed. Now, fairly suddenly, people at large had begun to say that " Science teaches us," rather as, in another age, they had said " The Church teaches us." Perhaps they were equally mistaken in both cases.

But he was " fearfully excited " about this manifestation. Science was beginning to be somewhat in the position once occupied by the medieval Church, as an international society whose word was listened to. Some even had been worried about their duty to international chemistry, as opposed to their duty to their country. That trend was coming again and he wanted it to grow. Scientists now were beginning to be aware of it and were beginning to make a fuss when politicians sought to make science a hush-hush, secret thing.

Responsibility and Power

He believed now that they were going to occupy a unique position in the world because of their internationalism. With power went responsibility. They wielded now the power to kill on a scale which in the past had belonged to armies, or to provide the means of living. He did not think there had been in the history of the world just such a thing. They were a young society with real power. The atom bomb belonged perhaps chiefly to the physicists, but he gathered from the best people that chemists could do even filthier things if they gave their minds to it.

It was easy for scientists to think internationally. Now that they had got this international society he urged them to have faith in that and in collective responsibility and to say that they had got to know how this new power was going to be used. Industrial chemists were now in a position to put the claim across forcibly.

Dr. Lampitt, responding, said that before the dinner he had thought that his "theme-song"—collaboration in the international sphere—would be out of place. The Master of Balliol had, however, put the ball at his feet. Chemists had been well aware of

their power and the last speaker had obliged them to think whether they as a body were going to take responsibility for the constructive and destructive forces they had placed in the hands of others. He was rather appalled by the realisation that mixed up with all their thoughts for the application of science to industry were also the results—which they had got to face—produced by the innate curiosity of man.

The Prime Minister, in a recent speech, had seemed to encourage the view that there were malevolent industrial groups which were delaying the application of the results of laboratory research to everyday uses. There was no truth in this. They, as chemists, knew full well that months or years necessarily elapsed before the work they had done could be brought to fruition.

Oldest Society

As recent examples of practical achievement they had such things as penicillin, which members of their society had helped to develop, and DDT. Theirs was an old society, old in the sense that the application of science to industrial ends was of very recent existence. They were, in fact, the oldest society of industrial chemists in the world, although the name of the society did not make their function clear, as it was in the titles of those more recently formed societies in France and elsewhere overseas. Because of that obscurity they had commonly been mistaken for a commercial organisation, as he had discovered in the period in which he was the society's treasurer.

They had hidden their light under a

Dr. L. H. Lampitt's table

bushel, but, none the less, their work had gone on and the world had continuously reaped the benefit of it. The Master of Balliol had spoken of their responsibility to world society. He cordially thanked him for having made them aware of their duty.

The toast of "The Visitors" was proposed by H. D. Potter and Dr. Roche Lynch, in the course of his reply referred to the gratification caused by the presence of the Master and Wardens of the Salters' Company, who had rendered great service in promoting the advance of chemistry.

S.C.I. Luncheon

The most enduring impression of the luncheon, at which Mr. Julian Leonard, chair-

Mr. F. Curtis, of Monsanto, in conversation with Dr. Lampitt

man of the Chemical Engineering Section, presided, was the characteristically witty speech in which Mr. C. S. Garland, a founder member to whom the chemical engineers owe much of the credit for their present strong organisation within the society, proposed the toast of the various sections and their chairmen, associating with the toast the name of Mr. Leonard. Emphasising the unique nature of the gathering, comprising all the sections and groups, he maintained that the luncheon disproved Euclid's axiom: that was an occasion when the sum of their parts was much greater than the whole. He endorsed the theory that there should be a closer affinity between a chemist in Nottingham and, say, a chemist in Manchester than with that chemist's next-door neighbour. Similarly, chemical engineers had a closer affinity with each other than with the chemists of food or agriculture. Chemical engineers had rendered good service to the community, being responsible for the maintenance of many sides of industry, and, unlike some others, they did not leave the job "when they dam' well pleased."

He took next in order of importance the Plastics Group, who supplied their every need from the cradle to the grave, including in the end a "Bakelite" coffin, and whose only omission had been their failure to supply us with synthetic coupons. The importance of the work of the Food Group had increased greatly since the piping days of peace (when good food could be bought for 12s. 6d. a bottle), and the Nutrition Panel had also a very important rôle which had necessitated several visits abroad, which themselves were a useful pointer—"If you want good food you cannot do better than follow the Food Group."

A view of the dance floor at the Connaught Rooms during the reception and dance

The most important achievement of the Agricultural Group had been their work on selective weed killers. He disregarded for the moment the fact that they had, when asked to deal with the weed on his lily pond, recommended him to buy some ducks—which subsequently devastated his garden. He recommended to them the job of finding a selective killer which would wipe out the whole of our enemies while leaving our friends standing.

Responding to the toast, Mr. Leonard said the Chemical Engineering Group was honoured in having been called upon to provide the chairman on the unique occasion of the gathering together of all the groups of the society. Their group was older by more than 30 years than any of its brethren and was entitled to be regarded as the uncle of the groups, one of which had produced progeny in the form of the Nutrition Panel. All the groups, he was glad to say, worked in close and increasing co-operation and had a common bond in chemistry. Best of all, all the groups were "extra territorial" and their work was not confined within that of any one section. Thus the interest which members of their groups took in each others' activities was not confined to members of the same section.

Dr. M. A. H. Tincker, chairman of the Agricultural Group, who proposed the health of the guests, noted that many of them had come from afar, from overseas and from the Colonies, and brought with them a happy contact with other spheres of thought, helping perhaps to prevent us from becoming introspective. On behalf of the Agricultural Group he was very happy to extend a warm welcome to Mrs. Lampitt and to Sir John Russell, a former president of the society. Sir John, replying, expressed the warm appreciation of the guests of the delightful entertainment they had received and of the opportunity of meeting old friends and colleagues from overseas.

INSTITUTE OF METALS

39th Annual Autumn Meeting

THE thirty-ninth annual autumn meeting of the Institute of Metals is this year to be held in Glasgow from September 23-26 at the invitation of the Scottish local section. A comprehensive programme drawn up for the occasion embraces the social as well as the more serious aspect of the Institute's activities. A civic reception is scheduled for September 24, and a dinner and dance for the following day. Four (and possibly five) papers recently published in the Institute's Journal will be discussed, while a number of works visits have also been arranged. Ladies' interests are to be sustained by a visit to the Trossachs and places of historial interest.

British Glues' Development Programme

A £300,000 programme of reconstruction and development for factories of British Glues & Chemicals, Ltd., was referred to by the chairman (Mr. Roger Duncalfe) in his speech at the recent annual general meeting.

The effects of the fuel crisis could be seen in the slowing up of deliveries of structural equipment, plant and machinery required for development purposes. This, explained the chairman, had impaired the company's production plan, and could only aggravate the shortage (both at home and abroad) of the essential products manufactured by the company.

"Engineering and Technical Qualifications" is the title of a 27-page booklet just published by the Advisory Bureau for Research. Its object is to encourage specialisation, which can be achieved "by publishing articles in the technical Press and delivering papers before the technical societies or institutions."

SILICON ORGANIC COMPOUNDS—I

Wide Adaptability of Silicones and Silicon Esters

by A. E. L. JERVIS and K. MOCHLINSKI

IN our issue of July 13, 1946, a few notes were published on the uses of organic compounds of silicon. Brief reference was made to silesters, silanics and silica white. In the year which has elapsed the authors have had the opportunity of an uninterrupted study of this subject, the vast field of which is shown in Fig. 1, and on which current literature is very scanty—at least on this side of the Atlantic.

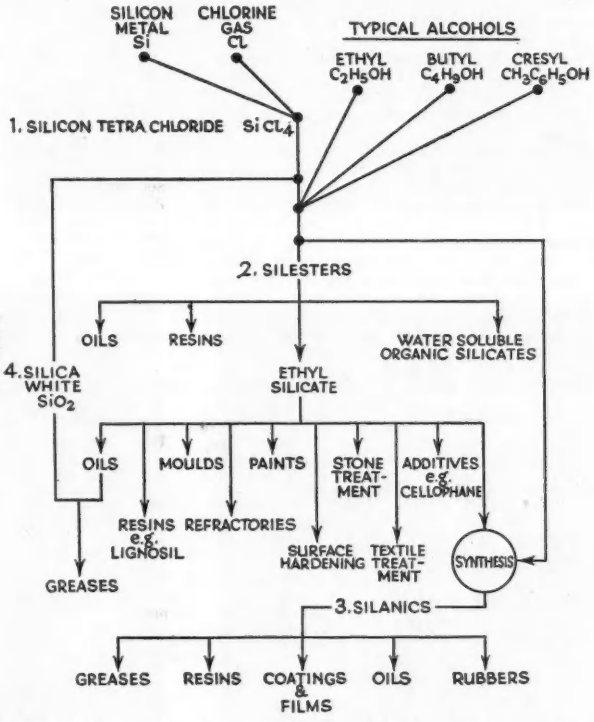


Fig. 1. The vast field of silicon organic derivatives

There are alternative definitions of organo-silicon compounds—strictly such a compound is one containing silicon and carbon atoms directly linked as in the silicones. In this case it will be remembered that there is a chain of -Si-O-Si atoms, terminated by a carbon atom at each end, the two remaining arms of each silicon atom carrying two further carbon atoms. In each case the carbon atoms are part of a hydro carbon radical, such as C_2H_5 (ethyl) CH_3 (methyl) and C_6H_5 (phenyl).

A broader definition is any compound which contains carbon and silicon atoms not necessarily directly linked.

This lets in many interesting materials such as ethyl silicate and tetra cresyl silicate (which is suggested as a heat transmitting liquid at 380° C.) about which more will be said later.

History

Some of the outstanding events in the organo silicon field are shown in Fig. 2. For reasons of space reference here is confined to Professor Kipping's work. In 1896, in conjunction with the late Professor Sir William Jackson Pope, Professor Kipping had successfully concluded certain researches on optically-active camphor derivatives. He then decided that it would be

interesting to find out if silicon compounds behaved in a similar manner. Eleven years of hard work followed, and in 1907 the first active silicon compound was obtained. During this work, several of the so-called silicones were prepared. In all, Professor Kipping and his co-workers devoted over 40 years to the organo-silicon field and their findings are certainly worthy of examination.

Silicones and Silicon Esters

Although the word "silicone" is a misnomer, it is one which is very easy on both the tongue and the ear and it has come to stay. Silicones are however more correctly covered by the heading "Silanics" as shown in Fig. 1, while esters (an ester is the product of an acid and an alcohol) come under the heading "Silesters."

It is however interesting to note that there are at least five groups of silicon esters:

1. The esters of ortho silicic acid—in which all four silicon valencies are attached to carbon through oxygen.
2. Esters of the polysilicic acids.
3. Esters which contain a halogen atom directly attached to a silicon atom.
4. Esters which contain carbon atoms directly attached to silicon atoms.
5. Esters which contain two or more silicon atoms directly linked. Fig. 8 will be found helpful in considering these esters.

The best known silicon ester is ethyl silicate, Fig. 6, and, apart from a brief reference to tetra cresyl silicate, it is the only one to be considered in the present article.

Manufacture of Ethyl Silicate

Ethyl silicate was first prepared by Ebelmen in 1846 and is now manufactured in this country at the plant of Messrs. Silicon (Organic) Developments, Ltd., at Bridgend, where photographs 3, 4 and 5 were taken. It is made by reacting silicon tetra chloride with ethyl alcohol, leaving hydrochloric acid as a by-product, as shown in Fig. 7.

The substance has many applications, ten of which are listed in Fig. 1. When ethyl silicate is reacted with commercial alcohol containing, say, 6 per cent water (methylated spirits, for example) there is deposition of silica (SiO_2-silicon di-oxide) and this process has been commercialised in connection with the protective treatment of stonework. It can be used either for the restoration of old stonework, or to prevent erosion.

The commercial application of the process is, of course, a highly specialised technique and architects and builders in collaboration with chemists have given much time and thought to the problem.

Very efficient keyed impregnating coatings on both new and old stonework can be obtained using mixtures of ethyl silicate and alcohol. In certain cases the work takes on the nature of a surgical operation, parts of the stone being cut away and fresh pieces inserted in conjunction with the ethyl silicate treatment. It is interesting to note that varying colour effects can be incorporated in the ethyl silicate mixtures.

When blended with suitable admixtures silicon esters are valuable as fire resistant

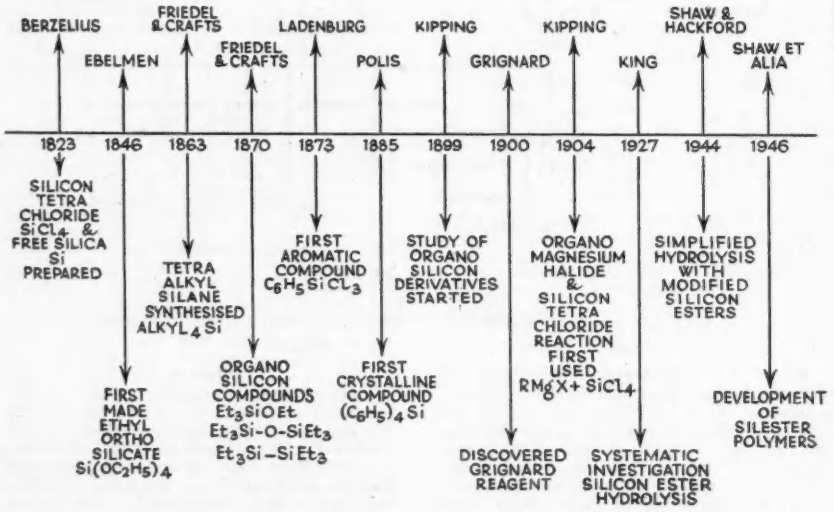


Fig. 2. Some of the outstanding events of organo silicon chemistry

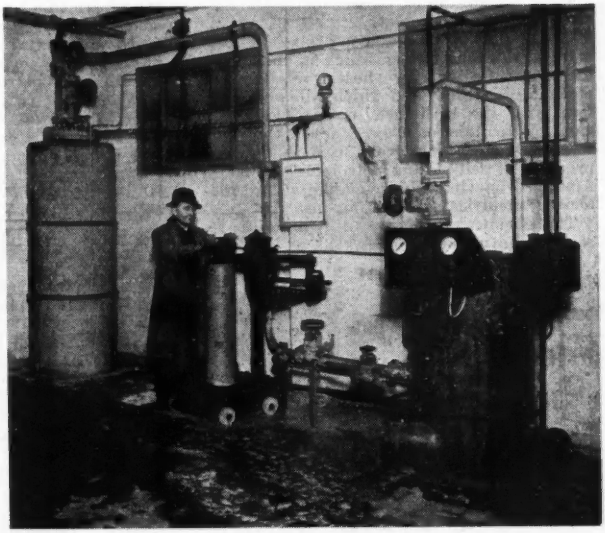


Fig. 3. Weighing the liquid chlorine, of which there are approximately 70 lbs. in each container, for the experimental production of ethyl silicate

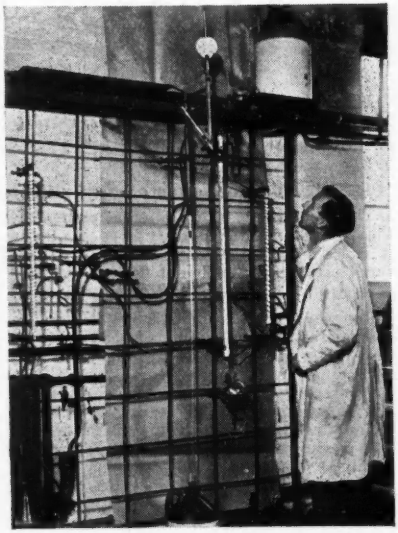


Fig. 4. Silicones experimental unit. Falling films stripping apparatus for removing volatile solvents from silicon compounds

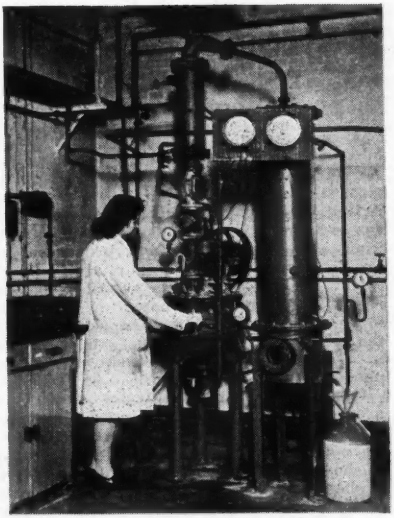


Fig. 5. This stirred steam heated reaction vessel, for treating silicones and silicon esters is fitted with reflux and product take-off condensers

coatings, because, on hydrolysis, they form a layer of pure silica on the materials they are intended to protect.

Used with paint the ester gives a permanent siliceous binder which is chemically inert, unaffected by heat, weather or mechanical attack, and which will not interfere with the brilliance of the paint pigment. In this country, during the war, silicon ester coatings were used in the fireproofing of self-sealing petrol tanks, and in America they have been employed for protecting theatrical scenery against fire.

The chemical structure of ortho silicates can be shown thus:

Where Si = silicon
O = oxygen
R = an organic radical.

In the case of ethyl ortho silicate the organic radical R = Et = ethyl = C_2H_5.

The chemical structure can therefore be shown thus:

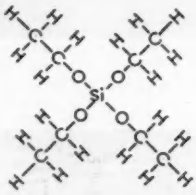
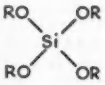


Fig. 6. Chemical structure of ethyl ortho silicate

A new resin, "Lignosil," made from ethyl silicate, is suggested as an alternative (or as an admixture) to phenolic resins. The most striking claim made for this new resin is that it will bond cellulosic materials such as saw-dust, wood flour, paper, cotton, wool, etc., when used in a proportion as low as 4 per cent of the total mixture, which is much lower than in the case of phenolic resins. The curing is based on the ester interchange reaction between cellulose and the silester resin under heat and pressure in a manner similar to techniques used for phenol formaldehyde resins.

Other liquid organo-silicates which are arousing considerable interest at the moment are the tetra-aryl-ortho-silicates. Here again the broad chemical structure is as shown in Fig. 6. R can be, for example, a phenyl or a cresyl group. For the sake of simplicity only one compound will be considered, namely, tetra-cresyl-silicate. This liquid can be used as a heat transfer medium for temperatures up to 380°C., without pressure. (Its boiling point is between 435° and 440°C.) In the past many substances have been considered as heat transfer media as alternatives to water and steam. These include petroleum, certain fused salt mixtures, mercury and so on. All of these have certain disadvantages, the fire hazard with petroleum is well known; the cost of mercury is high; certain salt mixtures freeze at temperatures as high as 300°F. and so they cannot be used at normal room temperature.



1. Ethyl silicate is an ester, *i.e.*, the product of an acid and an alcohol.

2. The broad chemical reaction involved in its production is as follows:

$$4ROH + SiCl_4 \rightarrow 4HCl + Si(OR)_4$$

Alcohol + silicon tetra chloride gives Hydro chloric acid + ethyl ortho silicate

3. In our case the organic radical R = Et or in full C_2H_5.

4. The expression can therefore be written:

$$4C_2H_5OH + SiCl_4 \rightarrow 4HCl + Si(OC_2H_5)_4$$

Ethyl alcohol + Silicon tetra chloride gives Hydro chloric acid + Ethyl (ortho) silicate

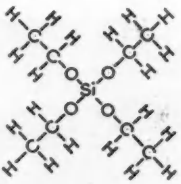


Fig. 7. The production of ethyl silicate

The advantage of tetra cresyl silicate is that the change in viscosity is so small that it remains liquid at low temperatures and small pipes allow sufficient flow.

Silicones

For the purposes of this article and for comparison with existing electrical insulating materials, silicones can be considered in five groups; rubbers, ceramic and glass coatings; resins and varnishes, liquids, and lubricants, greases and sealing compounds.

The derivation of silicones is interesting and is shown in Fig. 9. As regards their chemical structures they can be straight chains, branched chains, or cyclics as shown in Fig. 10.

All members of the silicone family exhibit the following characteristics; temperature stability; chemical inertness; moisture repellency and good electrical properties.

The need for a heat-resistant insulation for electrical leads, and for a satisfactory

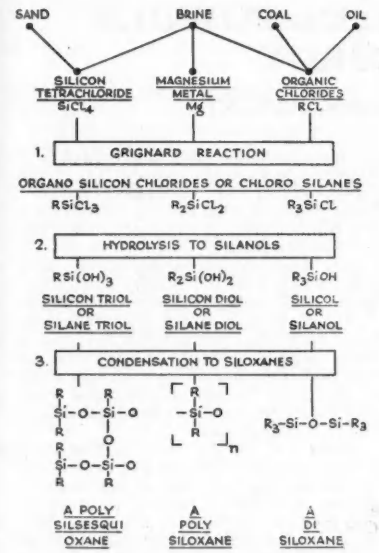


Fig. 9. Derivation of silicones

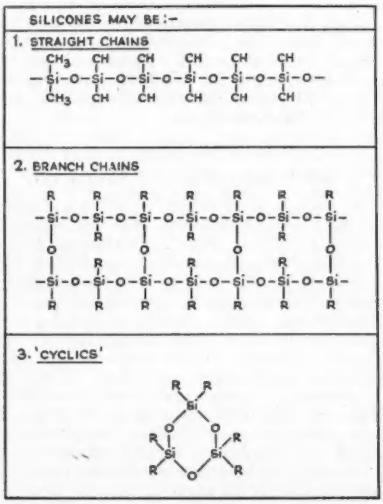


Fig. 10. Structure of silicones

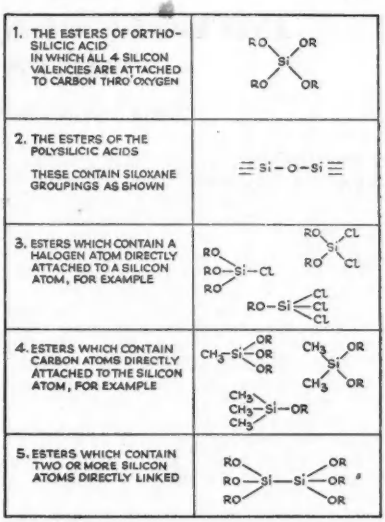

1. THE ESTERS OF ORTHO-SILICIC ACID IN WHICH ALL 4 SILICON VALENCIES ARE ATTACHED TO CARBON THRO' OXYGEN
2. THE ESTERS OF THE POLYSILICIC ACIDS
THESE CONTAIN SILOXANE GROUPINGS AS SHOWN
3. ESTERS WHICH CONTAIN A HALOGEN ATOM DIRECTLY ATTACHED TO A SILICON ATOM, FOR EXAMPLE
4. ESTERS WHICH CONTAIN CARBON ATOMS DIRECTLY ATTACHED TO THE SILICON ATOM, FOR EXAMPLE
5. ESTERS WHICH CONTAIN TWO OR MORE SILICON ATOMS DIRECTLY LINKED

Fig. 8. Types of silicon esters

gasket material for very high temperatures, has speeded up the development of silicone rubber. Its performance under extremes of temperatures and humidity suggest that it is superior in many respects to the more common natural and synthetic rubbers.

A typical silicone and a good quality synthetic rubber were tested together. The former, after a year at 300°F., had hardened only slightly, whereas the latter became hard and inflexible after only 35 hours. Silicone rubber has been used for long periods at 500°F. in the form of gaskets for drying and baking ovens. It retains its flexibility at a temperature as low as - 70°F., and it is claimed to have softness and resilience equal to natural rubber, but it has somewhat lower tear resistance and tensile strength. During the war, for production reasons, the use of silicone rubber was concentrated on gaskets for navy searchlights and aircraft superchargers working under very difficult thermal conditions. As a gasket material it outlasts both ordinary rubber and asbestos because of its better thermal resistance and its greater humidity resistance. It does not adhere to metal and it is unaffected by oils.

More recently, silicone rubber has attained prominence as high temperature electrical insulation. Several compositions have been developed having very good insulating properties, suitable for processing on standard rubber fabricating equipment.

Silicone rubber is also used for flexible insulating sleeves, radio equipment, anti-vibration mountings and coatings for wire-wound resistances.

(To be continued.)

IMPROVEMENTS IN POWDER METALLURGY

TWO NEW AMERICAN PATENTS

INTERESTING patents relating to metal powders have lately been issued in the U.S.A., for some of which applications date from 1940 or thereabouts. Presumably they are among the fairly large number kept secret during the war.

The first is for the production of powdered iron and sintered articles therefrom, by General Motors Corporation, the corresponding English patent application being 12370/1947, and Conv. date August 14, 1940. A mixture of finely powdered mill scale and powdered carbon iron alloy, such as white iron or steel, is heated at 1400-2000°F. in an atmosphere containing reducing gases to reduce the scale to iron without melting it and decarburise the white iron or steel particles. The amount of carbon in the white iron or steel is sufficient to combine chemically with the oxygen in the mill scale.

The mill scale is first comminuted to pass through 250 mesh screen and mixed with powdered white cast iron or steel. In making sintered articles the mixture of powdered materials is briquetted and sintered at a temperature of 2000-2100°F. in a non-oxidising atmosphere under a pressure of 30,000 to 100,000 lb./sq. in., including suitable binders, fluxes, die lubricants, or pore-forming materials. The reducing atmosphere suggested by way of example is a mixture of carbon monoxide 10-11 per cent, hydrogen 13-16 per cent, carbon dioxide 4.5-5 per cent, and the balance of nitrogen.

Rapid Sintering

The second patent is by Charles Hardy, Inc., and relates to improvements in powder metallurgy, especially to improved methods of applying heat. The corresponding English patent application is 13447/1947. It is pointed out that the proper sintering of powdered compacts sometimes takes days and is even then imperfect. The object is likely to be distorted, so that the required tolerances are not met.

In the present method sintering is almost instantaneous in the die, thus minimising distortion and saving time. The products are of high density with little or no porosity. The bonding together is achieved by heating zones or points of contact between particles to a temperature, preferably not exceeding the melting point, by passing through an electric current of such strength that the contact points reach the necessary temperature practically at once. The compact is compressed at the same time between electrodes in such a way that the bulk of the mass remains solid and relatively cool, although sufficiently plastic to eliminate porosity under only moderate pressure. The whole mass in fact remains relatively cool and can be handled with bare hands almost immediately after ejection from the die.

The electrodes must be strong and of metal which does not readily alloy with the compact elements. They will usually form a pair of plungers in the die, properly insulated with glass or bakelite or lined with flakes of mica or the like, or metal flakes of a malleable nature (*see* U.S.P. 2342037) in which die linings of orientated overlapping flakes of malleable material are used, *e.g.*, aluminium flake.

Either a.c. or d.c. electric heating may be used, and the strength will depend on the specific purpose or kind of compact. The shorter the time of heating the less is the risk of diffusion, and in this case there is practically none. By repeated application of current over short intervals diffusion can be controlled as desired.

Suitable material for electrodes is a tungsten alloy supplied by P. R. Mallory Co. under the name of Elkonite 100W. Almost any metallic flake material may be used: ordinary aluminium flake as employed in paints is satisfactory, containing a small proportion of leafing agent such as stearic acid. It is preferable, however, to add a certain amount of stearic acid, this and the metal flake being suspended in a suitable vehicle, such as benzol. Density of current used may be up to 2,000,000 amp./sq. in. for 1/60th of a second, voltage 5-20, and pressure 7½ tons/sq. in.

Oil Production in Morocco

A French Parliamentary sub-commission recently arrived at Rabat, Morocco, where it visited the Gharb Plain oil wells and toured the Petit-Jean refinery which was built at the beginning of the war. The commission's task is to investigate the possibility of industrialising the country. Development plans which have been drawn up by the Resident-General in co-operation with the Cherifian authorities, envisage large-scale prospecting for petroleum in the Gharb Plain. Between 1939 and 1945 about 31,000 tons were produced, nearly all of which was refined at Petit-Jean. Drilling equipment is understood to be obsolete and any extensive oil searches would seem to depend upon the arrival of new equipment from the U.S.A.

American Chemical Notebook

From Our New York Correspondent

AN unprecedented demand for new chemical processing plants has developed in the United States because present manufacturing capacity for chlorine and caustic soda are heavily overtaxed. This is the substance of a statement in New York by Mr. Wells N. Thompson, vice-president of the H. K. Ferguson Company, industrial engineers with widespread affiliations. Despite wartime expansions in the chemical field, says Mr. Thompson, the demand for new facilities is just as sharp in the United States as it is in other countries. During the war many manufacturers feared that the United States would have an oversupply of chlorine because of the number of new plants built. All these plants are still in use, he said, and several chlorine producers are expanding existing facilities and most inquiries for new facilities call for capacity in excess of fifty tons a day. During the war the H. K. Ferguson Company built and equipped four Chemical Warfare Service chlorine plants in Maryland, Alabama, Arkansas and Colorado, and also supervised construction of two of the largest chlorine plants in the world at Natrium, West Virginia and at Henderson, Nevada. To-day, notes Mr. Thompson, there is a growing tendency among manufacturers who ordinarily purchased chlorine to construct their own plants. That was true also in other countries, where industrialists were finding it worth while to build small plants which would not be considered commercially profitable in the United States.

* * *

The first tables in a new and comprehensive compilation of "Tables of Selected Values of Chemical Thermodynamic Properties" have just been announced by the U.S. National Bureau of Standards. Published data of chemical thermodynamic properties have been widely scattered, necessitating a search of the literature by those who require such information. The new tables bring all available data together for the first time in a form readily accessible to the engineer, chemist, and physicist in scientific and industrial research. With accurate values of the appropriate thermodynamic properties available, it is possible to calculate the optimum conditions for manufacturing processes involving chemical reactions. The selected values are presented in three series of tables which are internally consistent in that all the known physical and thermodyamic relations existing between the properties are satisfied by the tabulated values of these properties. The three series are: Series I. Heat of formation at 25° C.; Free Energy of Formation at 25° C.; Entropy at 25° C.; Logarithm of the Equilibrium Constant of Formation at 25° C.; Heat of Formation at 0° K. (Arranged as groups of compounds)—Series II. Heat, Temperature, and Entropy of Transition; Heat, Temperature, and Entropy of Fusion; Heat, Temperature, and Entropy of Vaporisation. (Including values of pressure as appropriate.) (As groups of compounds).—Series III. Heat of Formation; Free energy of Formation; Logarithm of the Equilibrium Constant of Formation; Free Energy Function; Heat Content (or Enthalpy) Function; Entropy; Heat Content or Enthalpy; Heat Capacity. (Values tabulated for individual compounds; from 0° K. to high temperatures. Complete references to the data from which the selected values have been obtained will be published by the bureau later. References to experimental data which may have been overlooked in the selection of values of a given property and similar supplementary information will be welcomed by the National Bureau of Standards in Washington, D.C.

One set of the tables, with supplements as issued, is being furnished to each University Department of Physics, Chemistry, or Engineering, and research institutions, and industrial laboratories may obtain one set each upon application to the Bureau.

* * *

Production of sulphuric acid in the United States in 1946 amounted to 8,649,163 tons, a slight decrease from the 1945 total, according to the Bureau of the Census, U.S. Department of Commerce. Areas of greatest production, in order of size, during 1946 were New York, Southeast, and Baltimore. In 1945, the three areas of greatest production were, in order, Baltimore, New York and the Great Lakes. The Census Bureau also reported that production of normal superphosphate fertiliser material in May was the highest for any month on record, with a total output of 803,501 tons, 5 per cent greater than April and 27 per cent greater than May, 1946.

* * *

Sweeping reductions ranging from 10 to 25 per cent in the prices of major volume synthetic resins for the paint, varnish, lacquer, adhesive and printing ink industries have been made possible by the attainment of full production at the new synthetic resin plant at Burlington, New Jersey, of the Hercules Powder Company. Typical of the lower values is the new price of 16 cents per lb. for Pentalyn A resin, a 16 per cent drop, and 15½ cents for Hercolyn, widely used as a replacement for castor oil in protective coatings and adhesives. "This

marks the first time," a company official said, "that a standardised pentaerythritol ester has sold for the same price as ordinary ester gum."

* * *

Nucleonics, a new monthly scientific magazine to be devoted to the peaceful uses of nuclear fission and covering the field of nuclear technology, as distinct from that of nuclear science, will make its first appearance in September under the sponsorship of the American publishing house, the McGraw-Hill Company. The new publication, combining three hitherto experimental magazines, will provide information on industrial, medical, and other applications of atomic power and its by-products. It will carry no advertising, and will be edited by Keith Henney who will be assisted by Walter M. DeCew, formerly of the Los Alamos project.

* * *

A 650 lb. plastic part, said to be the largest ever produced in the American General Electric Company's plastic division, has left the G.E. factory in Pittsfield, Mass., for the University of California, where it will be used as a component part of the university's newest atom splitting apparatus. Representing one of the most important projects ever attempted by the company's plastic division, which is the largest producer of finished plastics products in the United States, this synchrotron part measures 8 ft. in diameter. Together with nine additional G.E. plastics parts, it will form the vacuum chamber of the atom synchrotron where the physical properties of the plastics offer unusual strength and stability, combined with electrical insulation. It consists of seven rings, designed to bear the compressive load of the magnet, and three vacuum manifolds made of a low-pressure laminated construction to form the vacuum chamber in which electrons are accelerated. The plastic rings were made of layers of glass fibres bonded with a polyester resin. According to University of California scientists, the new synchrotron is designed to produce a beam of 300 million volt X-rays and combines certain features of the cyclotron with those of the betatron. Weighing less than either of the other two types, the new plant can explore the nature of materials with higher voltages.

Plastic synchrotron parts produced by the General Electric Co., plastics division, and used as component parts of the University of California's newest atom Splitting apparatus

* * *

Because American steel companies are determined to satisfy domestic demand before giving consideration to export markets, attempts of British buyers to place new contracts in America for steel deliveries to England have been unsuccessful, according to a spokesman for the British Iron and Steel Federation.

The British interests, which have been canvassing steel companies in the United States for the past three weeks, were able to "pick up only negligible tonnages," the spokesman said. Inquiries were generally met with the response that it would be "at least the end of the third quarter" before United States demand is satisfied sufficiently to permit volume shipments abroad.

Food Shortage Repercussions.—Because of the world food shortage, natives in Borneo are forsaking the copra plantations for their own food-producing gardens, reports the *New York Journal of Commerce*. This has resulted in a scarcity of coconut oil for soaps, shampoos, etc. The islands could produce 50,000 tons of copra for coconut oil a year, but last year turned out only 15,000 tons. Production of rubber is similarly being curtailed by the food shortage. Rubber output there this year is estimated at 20,000 tons out of a capacity of 50,000 tons.

Indian Linseed Oil for Australia.—Australian officials in New York announced this week that the Indian Government has given assurances that increased supplies of linseed oil will be shipped to Australia. In return, Australia has undertaken to allocate additional supplies of wheat for India on the understanding that adequate supplies are first made available for home requirements. The Australian Minister for Commerce and Agriculture, Mr. R. T. Pollard, said that the arrangement should be entirely satisfactory to Australian consumers and paint manufacturers. The amount of linseed oil expected from India this year is 6,500 metric tons.

IRON IN INDUSTRIAL WATERS—II

By a Special Correspondent

ANOTHER factor to be kept in mind is the formation of hydroxides in the presence of alkalies, a fact that is utilised in the lime-soda process of water-softening whereby iron impurity is also removed by the formation of insoluble ferric hydroxides which may then be removed by filtering through coke beds. The lime-soda treated water is sprayed from a great height by means of atomisers whereby oxidation of the slightly alkaline water supply occurs with the formation of iron hydroxide according to the equation

$$4\ Fe(HCO_3)_2 + O_2 = H_2O = 4\ Fe(OH)_3 + 8CO_2$$

A catalyst consisting of manganic oxide (as previously described in the use of manganese zeolite) may be provided for the oxidation process, or in this case the iron hydroxide itself will act catalytically when collected on the filter bed.

By this method the danger from iron contamination to the supply is not completely removed until the water has been further filtered through a bed of marble for the removal of carbonic acid liberated by the formation of ferric hydroxide from ferrous bi-carbonate according to the foregoing equation. The carbonic acid is thereby converted into calcium bi-carbonate by the equation

$$CO_2 + H_2O + CaCO_3 = Ca(HCO_3)_2$$

and the water rendered harmless insofar as any solvent action on the iron piping (from dissolved carbonic acid) is concerned.

Oxidation by aeration may also be carried out in closed equipment by blowing air under pressure through the water supply.

Sterilisation

Where algæic organisms and microbiological growths have contributed to the iron contamination of water supplies, some form of sterilisation may have to be considered. For this purpose chlorine is of great importance. The treatment will of course vary according to the extent of the pollution. In one instance, 4-minute duration dosages of 2-4 parts of chlorine per 1,000,000 parts of water were carried out every 90 minutes. Chlorination is especially valuable as it also provides a means of oxidation for the removal of iron, thus in certain cases dispensing with the necessity for aeration. Although chlorine is very effective as a bactericide and as an algæic growth preventative it is unstable in solution. Combination of chlorination with ammonia treatment provides a more controllable method of dosage. By this means are formed stable chloramines which break down very gradually and provide a slow but steady oxidising action.

The use of copper sulphate is also a means of cleansing waters of micro-biological infectons; 1 lb. per million gallons of water will suffice, but the possible danger of poisoning drinking-water supplies must be kept in mind when using this method.

German Patent No. 598,069 deals with disinfection of water supplies by the addition of very finely divided metals like copper and silver. In this connection also it may be noted that the use of silver and silvered sand has been shown to be very effective. It has been stated that 1 part of silver per 20,000,000 parts of water at *p*H7 will kill all bacteria in an hour.

Troubles from Iron in Water

Very large amounts of water are used in processing textiles in the finishing stages—desizing, scouring, bleaching, dyeing, printing and finishing require water supplies as free as possible from all types of impurity. It can readily be understood that fabrics of any description will act as very efficient filters for all impurities. In some cases there are even special affinities between fabric and impurities.

It is well known, for example, that cellulosic fibres of all types have a decided affinity for iron, manganese, silica, organic impurities, etc., present in water supplies. If algæ and bacterial growths are also present to any extent considerable damage may be done in the form of stains, etc. In the case of wool dyeing, the iron may react strongly with the dyestuffs used, to give flattened shades and in some cases blotchiness due to decomposition and separation of the dyestuff from the dye liquor.

In rayon treatments the danger may even extend to tearing where deposits of iron from pipe-line accumulations have come into contact with the fibre. In this case it is not unlikely that ferrous hydroxide will have formed in the material while lying in a damp state exposed to the air and perhaps in a slightly alkaline condition. Rayon readily absorbs ferrous hydroxide and as has been shown in another connection, the latter has the power of acting catalytically on a filtering medium to bring about further oxidation. In the present instance the rayon acts as a filter and the ferrous hydroxide is readily oxidised to the ferric state by the addition of atmospheric oxygen. However, the oxidising reaction may not stop there and it is possible that the addition of oxygen to the cellulose may be a cause of tendering by the formation of oxycellulose.

GOOD HEATING UNIT

New Coke Burner

THE contemporary importance of the coke-fired semi-producer furnace providing controlled heat without smoke or other waste and with the minimum attention is widely recognised. The design which has been produced by the London and Counties Coke Association in conjunction with the National Federation of Gas Coke Associations appears to supply the current need exceptionally well, giving the advantages of practically automatic firing without moving parts. These furnaces are made in standard sizes to burn from 20 lb. to 10 cwt. per hour. Large numbers are now in use in conjunction with plant for drying and heating all kinds of materials, and have been adopted as standard by various makers of drying plants. They are ideal also for steam generation, being a convenient and efficient "Dutch oven" arrangement for the operation of small steam boilers, such as the vertical and cylindrical types.

The design is that of a brickwork furnace of domed type containing a large combustion or gasification chamber which is kept filled with a deep layer of coke. Into this chamber air is blown from a fan with control by means of a cold air admission damper, while the setting also includes a gas port and a spark trap, the combustion being regulated according to the operation of the air inlet fan.

Good Gasification

Extremely good gasification is given without any excess air, and the gas is all burned with high efficiency on the same general lines, for example, as the semi-producer furnace used in the gas industry for heating the retorts. It gives continuous combustion without any excess air, that is with a high CO_2 and very low free oxygen content in the exit gases. This conrolled heating is given, as already indicated, without any moving parts and with the minimum of attention. The gasification is of course smokeless, and is easily controlled by adjusting the degree of the forced air blast.

Coke lends itself particularly well to partial gasification firing of this description, unlike bituminous coal, where the problem is complicated by the formation of black smoke by unburned volatile matter with deposits of tar and other familiar troubles.

Prices of Oils and Fats

The Ministry of Food announces that there will be no changes in the prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the four weeks ending August 30, 1947.

(*Continued from p. 195*)

Tendering of rayon may also occur as the result of micro-biological attack and where this coincides with the presence of iron there is likely to be trouble. In waters used for rayon processing, therefore, very strict control must be exercised over all water treatments. It is possible that contamination in the early stages of manufacture may not become evident until a much later stage when damage might be irreparable.

Alginaceous growths, whether of ferruginous nature or not, can be very harmful in textile processing. They are filtered out by the fabrics during wet processing and are very tenacious. Indeed, in certain types of processing such as bleaching where calcium salts are used there is some reason to believe that such algæ deposits tend to be fixed in the fabric. In addition, there are all the possibilities of harmful reactions where iron impurity is also present, as has already been pointed out. Furthermore, mildew may form readily in material which is left in a damp state for any prolonged period especially if water has become polluted from a sewage source. Composite stains and discoloration of this type are often difficult to remove when the nature of some of the treatments required is considered along with the reactive nature of some of the forms of iron impurity which may be present.

Removal of Iron Stains

Deposition of iron on textiles is almost certain to lead to staining of a more or less serious character. Oxidation and precipitation of iron oxides on fabrics is accelerated (as has been shown) by exposure to actinic rays in humid atmospheres and the presence of alkalis is very conducive to the formation of hydroxides. Removal of stains may be brought about by the use of a solution recommended by the British Cotton Research Association—one oz. of oxalic acid and 1 oz. acid potassium fluoride in 1 qt. of water. This solution can safely be used for local spotting of any type of textile fabric until the stains disappear. After thorough rinsing, dilute ammonia is applied.

Titanium Tri-Chloride

Another suggestion for the removal of obstinate iron stains is the use of titanium tri-chloride which is said to be particularly efficacious by reason of its great reducing power.

A patented Dutch method employs phosphoric acid and glycerine in the proportion of 25 parts of 65 per cent phosphoric acid and 75 parts of 28 per cent glycerine.

Citric and other organic acids may also be used in combination with the foregoing constituents.

NITRATE HAZARDS UNDER REVIEW

LOOPHOLES IN EXISTING REGULATIONS

SINCE the devastating explosion resulting from the ignition in Brest Harbour last week of a cargo of nitrate of ammonia, chemical authorities throughout the country have been studying with anxious interest the existing data relating to this unstable chemical to see what guidance has been given in the past to minimise the risk of explosion when nitrate is being processed or transported in this country.

The result of most of these inquiries has been to show that the potential risks associated with the chemical in certain circumstances have never been adequately recognised. Now, with two recent disasters to its discredit—Texas City and Brest—nitrate of various kinds has come to be regarded with extreme suspicion, which takes little account of the possibility that gross carelessness may have contributed to causing both the recent calamities. Dockers in some Continental and American ports have lately refused to work on nitrate shipments.

Not an Explosive

Ammonium nitrate is not an explosive scheduled by H.M. Chief Inspector of Explosives. That department is, however, understood now to be examining available data to decide whether the chemical should be added to the list of materials whose explosive potentialities are recognised and for which safeguards are laid down by statute.

Statutory provisions in general show little or no recognition that the combustible nature of ammonium nitrate is more marked than that of scores of other industrial materials. The Factory Acts provide no ruling applying specifically to nitrate. Section 28 of the 1937 Act lays down in general terms obligatory precautions relating to grinding, storage and some other processes of "any substance which may be explosive." These deal with such subjects as the enclosing of plants and safe dispersal of potentially explosive dusts.

Even the Chemical Works Regulations 1922, pay no special regard to ammonium nitrate, although in the light of recent events the general provisions relating to the safeguarding of combustible materials of all kinds from naked lights now appear to have a very definite application in this regard.

The shipment and use of nitrate come within the sphere of activities of many organisations and authorities, but such provisions as exist appear to have been made without recognition of the special fire risks of this basic chemical. For instance, in the P.L.A's Conditions and Regulations relating to disembarkation of import goods are scheduled a great variety of "Dangerous Goods" (dynamite and other evident explosives), which are not allowed on any P.L.A. property, and of "Hazardous Goods," which are subdivided into four categories intended to correspond with the risk involved.

In this latter section, all nitrates listed (of ammonia, barium, lime, potash, soda), excepting nitrate of strontium, are classed "C." This merely requires that the shipment must be stored or deposited only at places specially approved for it, and seems likely to have been framed with the corrosive characteristics of nitrate chiefly in mind. Strontium nitrate is in the more dangerous category "B," of goods which may pass over the quays but may not be deposited. It is interesting to note in this connection other chemicals of a combustible character which are subject to little discrimination on that account. Potassium chlorate and ammonium perchlorate, for example are ranked with ammonium nitrate as a cargo which can be carried freely through the docks, provided it is not deposited in an unauthorised place. There are a number of other chemicals which some chemists might regard as potentially highly inflammable but for which the P.L.A. do not have special regulations.

France Bans Nitrate Shipments

Reports in Brest, following the disastrous explosion aboard the ammonium nitrate ship the *Ocean Liberty* suggest that the initial outbreak may have been caused by a carelessly discarded cigarette end. The report of the official inquiry is still awaited. Meanwhile, French Government authorities have banned the importation of sea cargoes of nitrate until further notice. Earlier the port authorities at Le Havre moved the 7210-ton United States cargo ship, *Arthur P. Fairfield*, loaded with 10,000 sacks of ammonium nitrate, outside the harbour as a precautionary measure.

Olympia Exhibition

In association with Metal and Plastic Compacts, Ltd., of Birmingham, A. C. Wickman, Ltd., will exhibit high frequency plastic welding equipment at the Engineering and Marine Exhibition, Olympia, from August 28 to September 13. The latter firm will also demonstrate H.F. dielectric heaters for drying and preheating applications, and H.F. induction heaters for brazing and heat treatment of metal parts.

South African Chemical Notes

From our Cape Town Correspondent

THE report on the South African cement industry by the Board of Trade and Industries deserves the attention of the investor, although its recommendation that the import duty on cement be raised is unlikely to have much practical effect, seeing that Europe is unlikely to have an exportable surplus for years to come. In its review of the industry, the Board expresses the view that although technical inefficiency has sometimes left room for improvement, too many producers fail to exercise due caution in selecting their limestone deposits. In 1938 the sales of inland producers were about 15,000,000 bags, compared with a capacity of 16,250,000 bags in 1945. Expansion in the next few years may increase the output by 8,000,000 or even 10,000,000 bags. If consumption increases in the next five years only half as fast as it did from 1934 to 1938, it would reach 20,000,000 bags by 1951. Companies with more than 75 per cent of their shares in South African hands accounted for over 75 per cent of the 1945 output. The balance was produced by firms having 90 per cent of their shares held overseas, *e.g.*, White's and National Portland Cement. The Pretoria group of companies control 60 per cent of the sales and make 70 per cent of the profits in the industry. In the less profitable concerns overseas shareholders predominate. These latter firms sell only 23 per cent of the cement and make only 13.5 per cent of the profits. The report mentions the experiences of a Cape Town firm with the importation of clinker, and refers subsequently to the formation of the Cement Sales, Ltd. as a result of competition between two large producers in the area.

It is interesting to note that while from 1937 to 1939 the cost of South African and imported cement customs, duty apart, was about equal in Cape Town, imported cement was the cheaper in Port Elizabeth and Durban, and the more expensive on the Rand. The report criticises the formation of "secret reserves" by the cement companies, and suggests that the shareholders could have claimed higher dividends from the actual earnings.

* * *

There is a shortage of refined paraffin wax in South Africa, and in consequence candle production at the present time amounts only to about 50 per cent of the 1941 figure. Until June 1946 supplies were imported from India. That source has been closed, however, and only a trickle of paraffin wax from other countries is reaching the Union. "Substitute materials are coming forward in good quantities, and within a few months it is hoped that production will be increased substantially, even though the 1941 peak cannot be reached," says one manufacturer. Countries in a position to aid the Union are refusing supplies of paraffin wax and offering manufactured candles at inflated prices instead. For example, a fairly large consignment of candles from Canada has been distributed in the Union. The wholesale price is 2s. 6d. a dozen, and the retail 2s. 10½d., *i.e.*, about double the controlled price of home-produced candles.

* * *

According to a statement by Mr. F. Crawford in the Northern Rhodesian Legislative Council recently, the Northern Rhodesian Government was anxious to start a factory for the production of cement. A cement plant of 50,000 lb. capacity is said to be available for purchase in Great Britain.

* * *

The chairman of the Transvaal Chemical Manufacturers' Association has said in Johannesburg that sections of the chemical industry are facing a number of difficulties due to the influx of imported goods. "The matter is not so much one of competition in price," he maintained, "for the article produced locally compares favourably with the overseas product in that respect, but the local industry has had to lay off a certain amount of labour, and the ugly face of unemployment is beginning to show itself." He blamed the prejudice of many South Africans against home-produced goods, a tendency that he attributes to the inferior products of certain mushroom manufacturers during the war.

"The vast majority of manufacturers in South Africa today give good solid value for money," he asserted. "Pound for pound the public of the Union gets as good value for its money in local goods as in those from overseas. If the consumers of this country were to give all South African products the support they give to overseas articles there would be an improvement in the finish of South African chemical goods." The only solution, he contended, is nation-wide publicity.

* * *

Mr. S. H. Miller, a businessman from Manchester, recently arrived in Cape Town before proceeding to Port Elizabeth where he investigated the possibility of establishing an industrial oil factory. He said his firm had selected South Africa in which to open a branch of its business because it considered the Union offered better prospects than any other part of the Commonwealth. About £15,000 might be spent on buying a site and erecting a factory.

Vinyl Ethers

Commercial Scale Production

THREE initial compounds in a new series of chemicals, the vinyl ethers, are now in production by Carbide and Carbon Chemicals Corporation at its plant in West Virginia. Vinyl ethyl ether is being produced now in commercial quantities and experimental quantities of vinyl isopropyl ether and vinyl ethylhexyl ether are available. Other vinyl ethers will be produced as the demand for them develops, and a series of vinyl ethers with from one to eight carbon atoms in the alkyl group is anticipated.

The vinyl ethers have already found many applications in Germany and, although new to American industry, are likely to become important chemical compounds there in a relatively short time. They are extremely reactive chemically and offer interesting possibilities both in chemical syntheses and in polymerisation to adhesives and plastic compositions. They can easily be polymerised in either the liquid or vapour phase, with a variety of catalysts. The polyvinyl ethers range from liquids to rubbery solids and waxlike balsams. As adhesives, they have been used in surgical tapes and elastic bandage tapes, where they have been found to be more stable to light and show better storage stability than rubber. They have also been used in pressure-sensitive adhesives for sealing envelopes and paper cartons, in laminating glass, in upholstering, in sealing cellophane and metal foils, and in bonding rubber and other materials to glass.

Copolymers of the vinyl ethers have been prepared with vinyl acetate, acrylic esters, acrylonitrile, styrene, and many other compounds. They have been used as plasticisers and tackifiers for synthetic rubbers and nitrocellulose, and as modifiers for alkyd and polystyrene resins. In synthetic polishing waxes, resin coatings, and lacquers, the vinyl ether polymers impart a lustrous finish to films which may be normally dull in appearance.

Calcium Carbide Production in Italy

Owing to the increased allotments of coal, the output of carbide of calcium in Italy is now regarded as satisfactory. Apart from the carbide produced for the needs of calciocyanamide and ferric acetate industries, 60,000 tons will be available by the end of 1947; 34,400 tons will be produced in north Italian factories and the rest in central and southern Italy.

Ultra-Rapid Plating

Effect of New Chemical Process

New chemicals will make it possible to plate metals from two to eight times faster than ever before, it was reported by Dr. C. E. Adams of the refinery research staff of the Standard Oil Company of Indiana at a technical meeting of scientists of the company held in Edgewater Park, Mississippi.

"These remarkable speeds have been made possible through the use of new sulphonic acids which give not only faster plating but also brighter finishes," Dr. Adams reported. "The new acids have the additional advantage that they can be used over a wide range of operating conditions and are, therefore, more 'fool-proof' than any previous electroplating bath."

Other possible uses for sulphonic acids, which are to be marketed by the Standard Oil Company's new chemical products department, include its use as a catalyst and where a strong acid is needed but where the oxidising characteristics of sulphuric render it unsuitable.

Increased Fertiliser Sales

In the course of his address to the 53rd annual general meeting of Fisons, Ltd., the chairman, Mr. F. G. C. Fison, said that, following the introduction of a more equitable price structure for the fertiliser industry, trading profits had improved and sales had increased. Sales of fertilisers for the 1945-46 season had risen, not only at home, but also in South Africa, Rhodesia and Canada, the total amounting to 1,381,065 tons, compared with 1,283,970 in the previous season. The chairman added that production extensions were making satisfactory progress despite rising costs. Instead of the £3 millions which he had mentioned a year before as necessary to cover capital expenditure over a 3-year period, it had now become evident that a figure of £4 millions must now be substituted.

Colombian Soda Factory

It is announced from Colombia that the Banco de la Republica—which already controls the exploitation of the State-owned salt mines is to finance the installation of a salt refinery and a soda factory near the Zipaquirá salt mines in the Department of Cundinamarca, as well as the draining of the river Neusa to provide water-power for these plants.

Home News Items

Eire Serum Factory.—A new factory for the manufacture of meat protein, serums and various gland extracts is to be started in Clonmel, County Tipperary. The promoters are Chappie (Ireland), Ltd.

Steel Works Plan.—Round Oak Steelworks, of Brierley Hill, Birmingham, is to undergo extensive modernisation, with the effect of increasing the firm's ingot and finished bar production by about 50 per cent.

Scottish Scientific Officer.—According to Sir Steven Bilsland, chairman of the Scottish Council (Development and Industry), a Scottish scientist of note is being invited to accept the post of scientific officer to encourage the use of research by industry in Scotland.

Nuffield Foundation Grants.—The second report of the Nuffield Foundation states that grants totalling £229,430 were allocated during the year ended March 31; altogether the Foundation has distributed £1,182,250 since its inception. Its spheres of interest include the medical, natural and social sciences.

Sequel to Soda Ash Shortage.—Because of the reduction in supplies of soda ash to industry principal producers of house and horticultural glass are making cuts of 50 per cent in deliveries. The cut of 30 per cent of soda ash supplies is seriously curtailing production said an official of a St. Helens glass works last week.

Northern Refineries Projected.—Plans to create a new large-scale oil refinery at Grangemouth will not interfere with the earlier project, supported by American interests, to construct an equivalent refinery on the Clyde, states the Scottish Regional Director of the Board of Trade (Mr. C. A. Oakley). The difficulties in transport to London and to markets in the south of England might, however, prove an obstacle to the Clyde scheme, he considered.

Rubber and U.S. Dollar Exchange

In the course of a statement circulated to United Sua Betong Rubber Estates' shareholders, the chairman, Sir John Hay, comments that natural rubber, which is still the largest of all our exports to the U.S.A., is capable of providing an amount of dollar exchange equal to the total of all U.K. domestic exports, and that that being so, any distortion of the price of rubber in relation to U.S.A. imports, must be a matter of great concern both to Britain and Malaya, especially in the present circumstances.

Technical Literature

Polyethylene Glycol Compounds

CARBIDE and Carbon Chemicals Corporation, a subsidiary of Union Carbide and Carbon Corporation, ras just published a new booklet, "Carbowax Compounds and Polyethylene Glycols." This booklet presents the properties, specifications, and uses of a group of polyethylene glycol compounds ranging in molecular weight up to 6000. A number of formulae are given for cosmetic creams and lotions, pharmaceutical ointments, and bases, and various types of maintenance chemicals, such as industrial cleaners and polishes.

Polyethylene glycols have average molecular weights ranging from 200 to 700, and are liquids at room temperatures, those above 1000 in molecular weight being wax-like solids. Their vapour pressure, hygroscopicity, and solubility in water and organic solvents decrease with increasing molecular weight. They dissolve in water to form transparent solutions which do not hydrolyse or deteriorate, are soluble in many organic solvents, including aromatic hydrocarbons, but are only slightly soluble in aliphatic hydrocarbons.

The polyglycols may be used as lubricants for rubber moulds, textile fibres, and metal-forming operations, where they are easily removed with water.

Fatty acid esters of the polyethylene glycols are excellent detergents, emulsifying and dispersing agents, and surface-active compounds, useful in textile processing compositions, insecticidal emulsions, and industrial cleaning and polishing.

* * *

No. 19 or "Rope Talks," the publication in which British Ropes, Ltd., who make ropes of all kinds, picture and describe entertainingly a host of affairs, carries on the tradition of its predecessors. Excellently produced and edited, it supplies an interesting commentary on such subjects as Bailey bridges, industry's part in the Arromanches epic, pilots and diamonds. The part played by ropes is introduced only incidentally.

U.K. Copper Consumption Rises.—Output of copper and copper alloy products during June amounted to 61,646 long tons with a copper content of 49,131 tons. The figure of 330,478 tons for the first six months of the year shows an appreciable advance over the same period of last year, when output totalled 299,933 tons. The copper content figures for the two periods are 260,667 and 230,059 respectively. Virgin copper consumption accounted for 167,893, and copper and alloy scrap 92,774 tons, the comparable 1946 figures being 152,226 and 78,233 tons respectively.

U.S. Fertiliser Exports

The newly formed U.S. Nitrogen Industry Advisory Committee, meeting for the first time, has discussed with officials of the Departments of State, Agriculture and Commerce a programme to expedite U.S. exports of nitrogenous fertiliser materials. World deficiency of such materials is estimated at a million short tons. The United States will import about 187,000 short tons and will produce approximately 686,000 short tons. From this total, the United States is committed to export 57,860 short tons. The nation's export quota goes to specified countries, subject to controls to equalise distribution. Controls are administered by the Office of Materials Distribution of the Department of Commerce with the advice of the Nitrogen Industry Advisory Committee. The use of priorities to assure deliveries to authorised foreign buyers is likely to form part of the scheme.

U.S. Chemists and World Relations

The American Chemical Society—its president, Dr. W. Albert Noyes, Jr., has announced—has appointed a new standing committee on international relations. Prof. Louis P. Hammett of Columbia University is chairman of the committee and other members are: Prof. Chester M. Alter, Boston University; Prof. Floyd T. Tyson, Temple University; Theodore R. Donlan, New York, of the Standard Oil Company of New Jersey; Dr. Foster D. Snell, New York, president of the American Institute of Chemists.

Metal Statistics, 1947 (pp. 816) published by American Metal Market in its 40th annual edition contains a general assortment of statistical information on ferrous and non-ferrous metals, and miscellaneous economic subjects. It records authentic world production and consumption figures and gives prices for which an outstanding event was the ending of government price control in the U.S. on November 10, 1946. The statistics dealing with production and consumption are gathered from various sources and particularly from the American Iron and Steel Institute, American Bureau of Mines, Bureau of Metal Statistics, Civilian Production Administration, Bureau of the Census, Copper Institute, American Zinc Institute, Lead Industries Association, and the Tin Research Institute.

Obituary

The death on July 30 is announced of PROFESSOR W. W. WATTS, aged 87, Emeritus Professor of Geology at the University of London.

PERSONAL

MR. H. E. MEADE, a director of the Beecham Group, has retired.

MR. G. J. AUSTIN has joined Wallace and Clark, consulting chemists, Glasgow.

MR. J. N. KILBY, a consulting metallurgical engineer, has joined the board of the Blaenavon Company.

MR. B. C. WESTALL and MR. J. EERDMANS have resigned from the Scottish Plastics board, to which MR. C. MILTON MARSHALL has now been elected.

MR. R. L. EVANS, for many years secretary of the Rugby Portland Cement Company, Ltd., has been elected a director. He retains his position as secretary.

DR. HAROLD BURTON has accepted the Chair of Chemistry at King's College of Household and Social Science, London University, the appointment to take effect from October 1 next. Dr. Burton has been senior lecturer in organic chemistry at Leeds University since 1942.

MR. G. A. DUNBAR (managing director, Beecham Export Corporation) and MR. H. G. LAZELL (managing director, McLeans) have been appointed assistant managing directors of the Beecham Group. The managing director, Sir Stanley Holmes, already has the assistance of MR. B. L. HOBROW.

MESSRS. G. R. MARSH and R. DIXON, sales director and technical manager respectively, of A. C. Wickman, Ltd., are leaving for the U.S.A. at the end of this month to renew contacts with American machine tool manufacturers. Together with MR. R. RYDER, of Thomas Ryder & Sons, Ltd., they will visit the American Machine Tools Exhibition to be held at Chicago from September 17 to 26.

Electron Microscopy Conference

Under the auspices of the Institute of Physics, a conference on electron microscopy will be held at Leeds University on September 16-17. The seventh of its kind, the conference will be concerned with the applications of the electron microscope rather than its construction.

Among eminent speakers scheduled to address the meeting are Dr. R. Reed and Dr. K. M. Rudall (Leeds University), Dr. E. Brieger, Dr. V. E. Cosslett, Dr. G. R. Crowe and Dr. C. F. Robinow (Cambridge), Dr. F. M. L. Sheffield (Rothamsted Experimental Station), Dr. A. E. J. Vickers (I.C.I., Billingham), and Mr. R. Page (Metropolitan-Vickers). Short contributions are invited for the 2.15-4.30 p.m. period on Tuesday, September 16. Applications for accommodation should be addressed to Dr. R. Reed, department of Biomolecular Structure, Leeds.

A CHEMIST'S BOOKSHELF

British Catalogue of Plastics. By E. Molloy. National Trade Press. 50s.

THIS catalogue is a comprehensive guide to the selection and use of plastics by the fabricator. Undoubtedly it will be a useful book in some respects but it has fallen below our expectations.

There are several articles on the various materials which are available but many of them have been given scant attention. The section entitled " Vinyls " should have been given far greater scope in view of the consumption of PVC and its co-polymers in industry. In connection with PVC a statement is made that PVC compositions are not soluble in common organic solvents. This is not strictly true as some of the Geon resins have a useful solubility range at various temperatures in methyl ethyl ketone.

PVC latex is undoubtedly a material which will be used to a great extent in the near future especially in the spreading industry, but this subject does not appear to have been dealt with in the encyclopædia. A further point regarding PVC is that Hycar O.R.-15 and Hycar O.R.-25 are compatible in all proportions with some PVC polymers and co-polymers. This property is of importance as the thermosetting properties of such mixtures make them suitable for higher temperatures than are normally possible with the thermoplastics. A further advantage of using the Hycars as plasticisers is that they are oil resistant. At the present time much work is taking place on the question of blending unvulcanised Hycar with PVC stocks.

In the section on Cellulose Acetate Plastics, no mention is made of the value of the methylene chloride method of manufacturing cellulose acetate.

Other points which should have been mentioned are the advances made in acetylene chemistry in recent years by Dr. Reppe of the I.G., and the possibility of hot gas welding of thermoplastics. High frequency welding is well illustrated but for some purposes is most unsuitable, *e.g.*, for lining chemical plant with unplasticised PVC and for this it is necessary to use the hot gas welding method. This field is at present in its infancy in the United Kingdom, possibly because PVC is being used so much for household goods, whereas in the future, when the present market has been satisfied, it will be used on a far greater scale for industrial purposes, for chemical resistant plant, etc.

It is possible that the announcement on Terylene and its discovery was not made until proofs had been completed for this volume and possibly some mention will be made of it next year in the section on synthetic fibres.

A further addition which the next edition should have is a complete section on the machining of plastics and full details of the tolerance on dimensional stability that can be expected with the various types of moulding powders for different thicknesses.

During the recent war, considerable attention was given to the weathering characteristics of plastics, but in this country the subject has been largely forgotten since V.J. Day, whereas in the U.S.A. much attention is still being given to this subject, especially as far as the application of plastics for extremes of climate is concerned.

Two sections which are of great value and will serve a need in the industry are entitled " Schedule of Chemicals and Raw Materials for Plastics Manufacture " and " Schedule of British Raw Plastics and Intermediate Materials." Data is given in both these sections for many products.

An extremely interesting section is that devoted to the automatic control of temperature, pressure and time in plastics mouldings. Many manufacturers are against the capital cost involved in such automatic controls. But a moulder who instals such equipment need have a minimum reliance on his labour. Fuel costs are also reduced to a minimum and the number of rejects falls with such control.

The British Catalogue of Plastics will fulfil a function in British industry, but I look forward to seeing the next edition which will undoubtedly rectify many of the failings of the present edition. Perhaps next time we will see in the Table of Contents details of the authorship, as without this we have to go through each section to find who has written any particular contribution.

Lansil's Indian Project

In the course of his annual statement, Sir Donald Horsfall, chairman of Lansil, Ltd., states that the company has concluded arrangements during the year to supervise the construction of a cellulose acetate plant at Hyderabad, India. In consideration of these services, the company would participate in the earnings of the Indian company.

Overseas News Items

U.S. Oil for Russia.—The U.S. Department of Commerce has granted an export licence for shipment of 248,000 tons of oil to Russia.

New Chlorine Plant for Canada.—The Dominion Alkali and Chemical Company of Beauharnois, Quebec, Canada, is planning to set up a new chlorine and caustic soda plant in the Dominion this autumn. Actual production is, however, not expected before 1949.

Rare Radio-active Substance.—A French metallurgist is understood to be making plans to carry out a search in the Yellowknife area of the North-West Territories, Canada, where he hopes to find deposits of a rare substance containing radio-active elements.

Belgians Plan Underground Gasification.—A syndicate of Belgian mine owners which has been studying U.S. methods of underground gasification of coal in the Alabama mines is planning a wide-scale adoption of the system in Belgium, where there are computed to be 1000 mines abandoned because of the higher cost of bringing the remaining coal to the surface.

Italy Still Short of Soda.—In spite of recent progress, output of soda in Italy has not yet caught up with the country's requirements. This is due to the fact that various industries consuming soda have been increasing their production. The output of electrolytically produced liquid soda is reasonably good, but the output of caustic soda lags behind, owing to the shortage of coal and the inactivity of the Monfalcone factory.

German Soap and Plastics Production.—The Rheinpreussen chemical works at Homberg will soon begin production of raw materials needed for the soap industry in Western Germany. One-third of the plant's capacity will be used for this. The former I.G. Farben establishment at Krefeld is to manufacture raw materials for the same purpose at Urdingen, where methanol for the plastics and pharmaceutical industry will also be produced.

U.S. Controls.—There is little likelihood that United States production of copper, lead and zinc will be sufficient to remove controls before June 30, 1948. Nitrogenous fertilisers probably will be controlled up to and including June 30, 1948. It may be possible to decontrol potassium fertilisers after the second quarter of 1948 and to decontrol phosphate considerably earlier. Export controls on industrial chemicals must be continued until the Atomic Energy Commission is organised to license the export of fissionable materials.

Austria's Coal Import Plans.—Austria, it is reported, will receive 110,000 tons of Ruhr coal from Germany, 80,000 tons from Poland, and 30,000 tons from the U.S.A.

New Iron Ore Discoveries.—Extensive deposits of iron ore within convenient freight distance of Western smelters were discovered in Iron County, Utah, during the wartime search for domestic metals and minerals conducted by the Bureau of Mines.

Plastic Shields for U.S. Navy.—The U.S. Navy is experimenting with a transparent plastic cover, designed to protect the men on a warship's bridge from weather, gun blasts and fumes. The U.S.S. *Manchester* has been fitted with one of the first models, consisting of plastic panels in a metal framework, mounted over the forward section of the open bridge.

Salt Discovery in Bulgaria.—An egg-shaped deposit of salt, which it is estimated will supply Bulgaria with salt for 4000 years, has been discovered 50 feet beneath the ground near Provadia, in Northern Bulgaria. The deposit is estimated to be about five and a half miles long, two and a quarter miles wide and 1090 yards deep. Experts believe that petroleum may also be found in the region, which is close to the oil-bearing region in Rumania.

U.S. Investments Overseas.—American direct investments overseas—in branches of American companies and foreign enterprises in which Americans hold 25 per cent of the voting stock—earned $520 millions in 1946, the largest total ever recorded. Direct investments abroad were worth $8100 million, 14 per cent more than in 1937. Largest dividends were: from Latin-America ($273 million), Canada ($126 million) and Europe ($48 million).

Japanese Traffic in Opium.—" One of the most flagrant violations by the Japanese Government of national drug laws and international treaties " is revealed by the U.S.A. Department of State and referred to in the 1946 report of the Permanent Central Opium Board, now operating under U.N.O. According to American authorities in Japan, in one small factory in Korea, operated by the Japanese Government in 1938, 2742 lb. of heroin were manufactured, and, in 1939, 2925 lb., of which during these two years 5291 lb. were consigned to the Manchukuo Monopoly Bureau. It is pointed out that the annual requirements of heroin for China, including Manchuria, were only 37 lb., and the total world medical needs were not more than 3600 lb. per annum.

Parliamentary Topics

Home Production of Carbon Black?

British Carbon Black—"Confidential."—"I cannot answer this question without disclosing information of a confidential nature regarding processes which are being considered for the production of carbon black in this country," said the Parliamentary Secretary of the Board of Trade (MR. J. W. BELCHER) in the course of a reply to a series of questions on carbon black supplies. Mr. J. Lewis had asked what raw materials were available in this country for the production of charcoal, or other black which would be acceptable to tyre manufacturers. He had asked earlier whether U.S.A. producers were altering processes of production of furnace black for the U.K. because of the British customs regulation requiring an all-gas certificate to qualify the import for the lower rate of duty. The addition of liquid hydrocarbons, he believed, was therefore being discontinued. He asked that the distinction in import duties should be eliminated.

Government Shares in Anglo-Iranian.—The total value of shares in the Anglo-Iranian Oil Company owned by the nation has risen since January 1 by about £49 million at present market prices.—MR. H. DALTON (Chancellor of the Exchequer).

Another Linseed Substitute?—Asked what steps were being taken to put to commercial uses seeds of the rubber tree, the Secretary for the Colonies (MR CREECH JONES) said: So far as I am aware there is no commercial use at present. I am aware that rubber seed oil is a drying oil suitable for use as a substitute for linseed oil, but there are great difficulties in the way of seed collections since there is usually a dense high ground cover on rubber estates. The seed also must be collected fresh and then rapidly dried before it is exported. It is being suggested that a trial consignment of Malayan seed dried on a copra kiln during the forthcoming seed season be shipped here for trial.

Linseed Oil Production.—Mr. Creech Jones (Colonial Secretary) announced last week that he was aware of the need for increasing the production of drying oils in the Colonial Empire, and that he was, in fact, already in communication with the Governments of such territories where the climate might be expected to allow the cultivation of linseed. As a result, a 4000 acre project is to be put in hand in Kenya this year. With regard to linseed substitutes, tung oil is already widely cultivated in Nyasaland. Whether or not large-scale development will follow depends upon the results of the trials.

Magnesia Refractory Materials

IN a recent French patent for an improved process for the manufacture of refractory materials containing magnesia, the Soc. de Recherches et d'Entreprises Indust. and Chim. of Paris, uses sea magnesia of fairly high purity which is roasted in a reducing atmosphere at a lower temperature (1300-1500° C.) than is commonly employed.

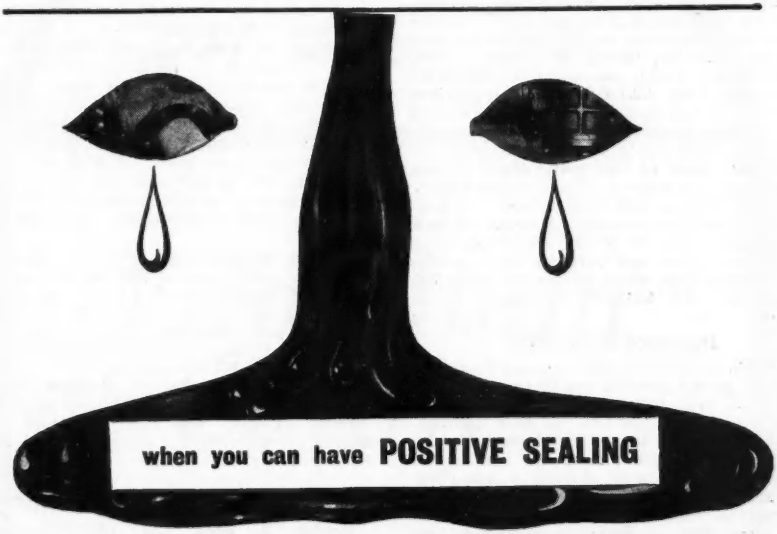
The object of the present invention is to start with sea-water magnesia, i.e. the oxide or hydroxide, which can be roasted in a reducing atmosphere, without addition of impurities, at a temperature below 1600° C. By way of example, nearly pure sea magnesia containing 96 per cent MgO, 0.6 per cent SiO_2, 0.13 per cent Al_2O_3, 0.35 per cent Fe_2O_3, 2.55 per cent CaO, 0.6 per cent sulphates, and traces of chloride, is baked for three hours at only 1300° C. in a reducing atmosphere in an induction oven with graphite lining. A good quality product is obtained with maximum density; and if roasted further for another three hours at 1400° C., still better results are obtained. (Corresponding English patent application is 30975/1946).

Dwindling Oil Output

A further decline in Rumanian petroleum production this year is foreshadowed by reports just published in the country. Estimates for the current year anticipate a mere 3,500,000 tons of crude oil output, and the dire lack of equipment makes a further decline to the three million mark a foregone conclusion. Of an order for 6000 tons of materials placed with Czechoslovak manufacturers last year, only some 1500 tons were so far delivered, compared with annual pre-war imports of drilling equipment (from all sources) of 30,000 to 40,000 tons. The country's reserves have been estimated by the director of the Geological Institute at approximately 100,000,000 tons. A revival of the once flourishing Rumanian petroleum industry is out of question without a thorough programme of re-equipment and intensified drilling, both in hitherto untapped areas and in the established fields.

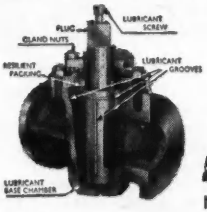
A resolution urging the development of Canadian mineral deposits with a view to attaining self-sufficiency in chemical fertilisers has received the general approval of the Canadian Senate. The motion, tabled by Senator J. A. McDonald (Lib., Nova Scotia) called attention to recent discoveries of high-grade phosphate rock in the Saguenay district of Quebec Province and of good quality potash in Saskatchewan.

NO USE CRYING OVER SPILT FLUID



One of the essential *functions* of a valve is to prevent leakage. One of the essential *features* of 'Audco' valves is that the ports are pressure-sealed with lubricant. 'Audco' valves, therefore, will not leak, internally or externally. Nor will they ever be difficult to turn, because the plug itself is pressure-lubricated. Foreign matter cannot enter because the minute space between plug and body seat is always filled with a film of insulating lubricant. For problems of corrosion and erosion, special 'Audco' lubricants have been produced to resist the action of the fluids. There is no type of fluid which 'Audco' valves cannot successfully control, and no application where they will not satisfactorily perform.

AUDCO
Lubricated
VALVES



AUDLEY ENGINEERING CO. LTD.
NEWPORT, SHROPSHIRE, ENGLAND Phone : NEWPORT 3246
MW 53

COMPANY MEETING

Beecham Group

THE 19th ordinary general meeting of Beecham Group, Ltd., was held on July 30 in London, Sir J. Stanley Holmes, M.P. (chairman and managing director), presiding.

The following is an extract from his circulated speech:

The trading profits and sundry revenue for the year ended March 31, 1947, earned by the companies and branches of the Beecham Group, operating in nearly every part of the world, amounted to £2,682,216 compared with £2,786,705 in the previous year. The set-back was largely accounted for by the loss of profits on home trade directly attributable to the fuel crisis in the early part of the year, which it was estimated amounted to approximately £150,000, due to enforced cessation of production and the payment of wages of staff temporarily unable to be employed. The profit on export and overseas trade, which is included in the above figures, was £644,745 compared with £543,580 for the previous year.

Increased Home Sales

The home sales of the company's subsidiary companies showed an increase of 8.33 per cent over those of the previous year. The basis of the business has been continually broadened. The sales of pharmaceutical products, which comprise 32 per cent of toilets and foodstuffs showed a gratifying expansion.

For the year under review over £378,000 has been spent in capital improvements and there are also commitments outstanding for future capital expenditure amounting to some £270,000 for the company and its subsidiaries. The directors felt that the time had come when permanent funding of the company's indebtedness to its bankers should take place, and accordingly they approached H.M. Treasury for permission to issue the major portion of the deferred shares remaining unissued. I am glad to say that we have received permission from H.M. Treasury to make such an issue, and deferred shareholders, to whom the issue will be confined, will in due course be notified of its terms.

The net amount available for dividend on the deferred shares and for reserve, after paying all charges, including preference dividends and taxation, was £504,409, as against £386,326 in 1946. The directors have already paid interim dividends of 36 per cent. The result will be that, of the balance of profits of £504,409, £332,750 will have been distributed to the deferred shareholders and £171,659 will be added to the carry forward.

Company News

Anglo-Iranian Oil Co., Ltd., announces a net profit of £9,624,938 for the year just ended, and a final dividend of 25 per cent (making 30 per cent for the year) is recommended.

C. C. Wakefield and Co. announce that profits for the 1946 period amount to £1,149,849 representing an increase of £436,738 over 1945. A final dividend of 75 per cent together with a cash bonus of 35 per cent is recommended.

Johnson & Sons, manufacturing chemists have announced a profit of £43,318 for 1946 as against £40,328 for the previous year. An interim dividend of 6 per cent has been paid on the ordinary shares.

Lansil Ltd., has reported a gross profit for the year just ended of £172,938, and dividends of 8.39 per cent and 15 per cent (both less tax) on the ordinary stock and deferred stock respectively, are recommended.

Mazapil Copper reports that a dividend of 15 per cent, less tax, will be paid on the £600,000 ordinary share capital for 1946. Dividends of previous years have been: 1945, 10 per cent; 1944, 7½ per cent, and 1943, 2½ per cent.

The nominal capital of **Colivita, Ltd.,** manufacturing chemists, Hawkeshead, Old Glossop, Derby, has been increased by £3000, in £1 ordinary shares, beyond the registered capital of £500.

New Companies Registered

Gordon E. Rose, Ltd. (438,973). Private company. Capital £100 in 1s. shares. To carry on the business of inventors, research engineers, chemists, etc. Subscribers: John E. G. Curthrop and Chas. H. Rickitt.

Universal Chemical Industries (London) Ltd. (439,102). Private company. Capital £1000 in £1 shares. To acquire the business of chemists now carried on by the Universal Chemical Co. Directors: Harold G. Brass; Arthur J. Penfold; Wm. I. Morgan; Alfred J. Reece and Sidney Randall. Registered office: 341a Ladbroke Grove, W.10.

Catalytic Co. of Great Britain, Ltd. (438,777). Private company. Registered July 12. Capital £500 in £1 shares. To carry on at Croydon and elsewhere agencies for the import, export, purchase and sale of catalyst goods; to manufacture and deal in catalysts, chemicals, gases, acids, compositions, electrical and chemical equipment, apparatus and other materials, etc. Directors: Robert F. Reed and David Bowman. Registered office: 128-130 Oval Road, Croydon.

$SO_2 + Oxygen \rightarrow SO_3$

Vanadium Catalyst

— a product of

IMPERIAL SMELTING CORPORATION LTD

37 Dover Street

London W.1

M-W.53

Chemical and Allied Stocks and Shares

AS was to be expected, stock markets moved very closely with British Funds and have recorded a general fall in values, although there has been a modest recovery from lowest levels which were reached in most sections towards the end of last week when 2½ per cent Consols were down to 82. Irredeemable gilt-edged stocks are now virtually on a 3 per cent yield basis and it is assumed in the City that official support for the market would be forthcoming to hold this level. The Government's crisis measures are the dominating factor at the moment, but following the indescriminate marking down of values which was in progress last week, buyers were in evidence, because in some instances industrial shares now seem relatively undervalued. The assumption is that many companies engaged in essential industries and playing a big part in export trade offer reasonable prospects of at least maintaining dividend payments, granted of course that the crisis is held in check and there is no repetition of widespread fuel shortage on the lines experienced earlier this year.

Imperial Chemical were down to 43s. at one time but attention was drawn to the good yield and to the fact that this was the lowest level since the distribution for the past year was raised from 8 per cent to 10 per cent. The price quickly rallied to 46s., but later eased to 44s. 6d. Fisons were down to 58s. 9d. B. Laporte marked 94s. 3d. at one time, Burt Boulton 26s. 3d., Monsanto Chemicals were 55s., and Morgan Crucible changed hands around 58s. 6d. Greeff Chemicals Holdings 5s. shares were dealt in around 16s.

British Glues & Chemicals were 19s. 3d., and elsewhere Dunlop Rubber at 70s. 9d., and De La Rue at 53s. 9d. were above recent lowest levels, while United Molasses at 51s. 9d. also showed a moderate rally, as did Turner & Newall at 78s. 9d., and the units of the Distillers Co. at 140s. 6d. also attracted some attention on hopes that the pending final dividend payment may be 5 per cent. General Refractories were 22s., and Goodlass Wall at 36s. 9d. moved above their reccent lowest. Pinchin Johnson were 61s 9d., and International Paint £7¼. Associated Cement have lost ground at 69s. 4½d. and British Plaster Board were 27s. 3d., while Metal Box shares changed hands around £5. Lever & Unilever were down to 49s. 4½d. Wall Paper deferred receded to 48s., but there was a better tendency in textiles after earlier falls, hopes being centred on export trade prospects. Courtaulds after falling heavily to 45s. 3d. have rallied to 46s. 6d. at the time of writing.

There has been a good deal of movement in the iron and steel section, partly because of alternating hopes and fears as to whether the Government is likely to bring forward nationalisation plans in view of the economic crisis. United Steel, Dorman Long and other leaders in this section were lower on balance, but there was some recovery from recent lowest levels, it being pointed out that if nationalisation were abandoned, the good yields offered by iron and steel shares would be bound to attract widespread attention; while if after all nationalisation were brought forward, fair compensation for shareholders would justify prices well above current market levels.

In other directions, Boots Drug at 59s. were above recent lowest levels, Beechams deferred also strengthened a little to 25s. British Aluminium were 4s., British Oxygen 96s. 3d., and Murex 92s. 6d. Oil shares have fluctuated sharply and were lower on balance. Before sentiment came under the influence of fears of reduced oil imports earlier in the week, Anglo-Iranian after being down to close on £9, had rebounded to £10.

Market Reports

WITH the shorter week and the annual holiday stoppage in a number of consuming industries, the general movement of chemicals against delivery specifications has been somewhat restricted. At the same time, there is a ready market for any spot parcels which may be offered and inquiries for new business, both for home and export account, are no less in volume. There is no doubt that a better container position would enable the chemical industry, particularly the tar products section, to show even better export returns than those published for June.

MANCHESTER.—An unmistakable effect on activity in the Manchester market for chemicals and allied products during the past week has been exercised by holidays in textile and other using works in Lancashire and the West Riding of Yorkshire. Fresh bookings for home use as well as on export account have been less in evidence and there has also been a more restricted movement of supplies of the alkalies and other leading heavy chemicals against orders already on the books of makers. Next week, however, should see a return to something like normal conditions, though the shortage in several sections is likely to cause a good deal of inconvenience at the using end of the trade.

GLASGOW.—Business has again been quiet in the Scottish chemical trade during the past week. Inquiries from overseas have been firmer and they cover the whole range of chemicals, particularly noteworthy in the demand from overseas has been potassium nitrate. It is expected that business will be returning to normal next week when the trade holidays are over.

5 IDEAS THAT HELP TOWARDS NATIONAL PROSPERITY

A Free Offer to every Business Executive

There is a remarkable unanimity as to the solution of our National problems.

It is agreed that business needs more output per man-hour.

In the last analysis National prosperity is contingent upon the prosperity of individual enterprise.

Yet not every business executive sees precisely how he can contribute towards this plan for increased production.

Here are five ideas towards this end. Every executive is offered them freely and without obligation—plus the service of a skilled consultant to help install them.

Just check them over, enter the appropriate number in the panel below and post it with your letter-heading. Details will be sent you within twelve hours.

NOTE.—These are only five of many such labour-saving,increased-production plans available. If your problem is not included, please detail it for the attention of the Shannon Research Department.

1. *Sales.*—A co-ordinated scheme for enquiries, follow-ups, sales, repeats, analyses of areas and products, salesmen's figures and quotas, etc., in such a way as to yield immediate and visible facts and figures.

2. *Advertising.*—A system which gives VISUAL and co-ordinated control of enquiries, results, sales, follow-ups, percentages, proofs, vouchers, correspondence, etc.

3. *Export.*—A visual control plan for progressing all export details from enquiries, shipping, etc., to the final account.

4. *Factory.*—A plan for controlling stocks, works orders, progressing purchases, personnel, including P.A.Y.E., material, deliveries, etc.

5. *Accounting.*—A new method of "bookless" book-keeping—plus a special control system for invoices, correspondence, finance, etc.

Shannon Systems

THE SHANNON LIMITED

527, Shannon Corner, New Malden, Surrey.

We are interested in Plan No.(s)..... Please send full details as per attached letter-heading. We should also like a free specimen of the following records (*please tick as appropriate*).

Overdue Accounts.	Medical Records
Sales—Prospects.	Job Records.
Customers.	Property Register.
Salesmen.	Hire Purchase.
Stock and Purchase.	Vehicle Service and
P.A.Y.E. (weekly or monthly).	Maintenance.
Personnel.	Single and Double Ledger.

(*Attach to your letter-heading*)

SWIFT

& COMPANY PTY. LTD.

Specialising in

INDUSTRIAL CHEMICALS, SOLVENTS, PLASTICS AND MATERIALS FOR MANUFACTURING INDUSTRIES THROUGHOUT AUSTRALIA AND NEW ZEALAND

Open to extend connections with *BRITISH MANUFACTURERS*

Head Office : **26/30, Clarence St., Sydney N.S.W. and at Melbourne, Adelaide, Perth, Brisbane and Wellington, N.Z.**

Cable Address : **SWIFT, SYDNEY**

Bankers : **Bank of New South Wales, Sydney and London.**

Suitable industrial gloves prevent accidents and increase production. *The "Evertrusty" Glove Catalogue No. 7*, which illustrates and describes gloves in all materials for every type of work, will gladly be sent on request.

WALLACH BROS. Ltd.

49, Tabernacle Street, London, E.C.2. CLE 1448/9

W5

Technical Reports

THE total number of German and Japanese Industrial Reports now available is 2297 (2200 German and 97 Japanese).

Reports on Japanese industry so far received are almost exclusively from American sources and are in most cases compiled by teams of United States Service Personnel, and readers are reminded that many of these reports are of a preliminary nature and do not go into great detail.

To avoid infringing patent rights firms interested in exploiting any particular item are advised to investigate the patents position in the United Kingdom before going into production. Similar investigations are also desirable before exports are made to any particular country abroad.

CIOS XXXIII—42. Hydrogen peroxide production at Hollriegelskreuth. Part 1. General notes and potassium persulphate process (7s.).

CIOS XXXIII—44. Direct synthesis of hydrogen peroxide by electric discharge (6s. 6d.).

BIOS 1060. German acetylene chemical industry, butadiene (6s.).

BIOS 1091. Rock drilling bits tungsten carbide tipped (1s. 6d.).

BIOS 1283. The welding of polyvinyl chloride, summary of German practice (2s.).

BIOS 1292. German acetylene chemical industry, methyl vinyl ether (1s. 6d.).

FIAT 749. Regular intergrowth of synthetic phlogopite with hydrous mica (3s.).

FIAT 1019. Magnesium carbide and methylacetylene (1s.).

FIAT 1047.—The manufacture of inorganic mercury salts from prime virgin mercury at Chemische Fabrik Marktredwitz, A.G. (1s.).

FIAT 910. Production of pharmaceutical and industrial enzymes in Southern Germany (4s.).

FIAT 969. Acetylene generation. Dry method (4s.).

FIAT 994. The purification of sulphur with oleum (1s.).

BIOS MISC. 1. The German plastics industry (32s. 6d.).

BIOS/JAP/PR/861. Report on the magnesium industry of Japan (1s.).

BIOS/JAP/PR/900. The copper industry of Japan (3s. 6d.).

BIOS/JAP/PR/1159. Dolomite resources in Japan (2s.).

CHEMICAL LEADWORK

TANKS — VATS — COILS — PIPEWORK

W. G. JENKINSON, Ltd. Telephone 22473

156-160, ARUNDEL STREET, SHEFFIELD

Specialists in
Carboys, Demijohns, Winchesters
JOHN KILNER & SONS (1927) LTD.
Tel. WAKEFIELD 2042 Established 1867

For service and satisfaction

Let us quote for COMPLETE TAR PLANTS; NEW STILLS OR REPAIRS; RIVETED OR WELDED, Benzol Stills, Tanks, Jacketed Pans and all types of

STEEL PLATE WORK

for chemical processes.

LEEDS & BRADFORD. BOILER CO., LTD
STANNINGLEY, near LEEDS

GOVERNMENT SURPLUS
GAUNTLETS
NO COUPONS 5 PAIRS 2/6

Brand new and waterproof material. "Never in the history of Government Surplus Offers has so much been offered for such little money." 5 pairs 2/6 or 48/- gross post free.
Another superb offer — BRAND NEW WATERPROOF KNEE BOOTS rubber soles. No coupons 2/6 post 1/-. ALL ELECTRIC ALARM CLOCKS with manufacturer's guarantee, 55/-, post, etc., 1/3.
HEADQUARTER & GENERAL SUPPLIES LTD., (CHA/G/2), 196-200, Coldharbour Lane, S.E.5.
1 min. from Loughborough Junc. Stn. London

EX ARMY BELL TENTS £8.15.0

Complete for use. Centre pole and all accessories. Reconditioned. Sleep 8. Ht. 9ft. 6in. Circ. 44ft. £8.15.0
RIDGE TENTS, 14 ft. by 14 ft., ht. 7 ft. £15.15.0
COTTAGE TENTS, 10 ft. by 10 ft. ht. 12 ft. £16.16.0
MARQUEES, 30 ft. by 20 ft., ht. 14 ft. £38.15.0
complete, also larger sizes.
SHIPS TARPAULINS. Approx, 360 sq. ft., £6 includ. carr. 720 sq. ft., £12 includ. carr.
EX-GOVERNMENT JACK KNIVES Slightly soiled. Price 3/9 each, post 6d. 3 for 10/6 includ. post.
PARATROOP BINOCULARS, weigh only 7 ozs. 45/-. Post etc. 1/-
HEADQUARTER & GENERAL SUPPLIES LTD., (CHA/BT/2), 196-200, Coldharbour Lane, London, S.E.5.
1 min. from Loughborough Junc. Stn., London

J. M. STEEL & Co., Ltd.

Abrasives	Dehydrated Castor Oil	Polishing Rouge	Sodium Sulphate desiccated
Acidproof Cements	Diammoniumphosphate	Potassium Bichromate	Solvents
Antioxidants	Ethyl Cellulose	Preservatives for Glues, etc.	Strontium Salts
Asplit Impervious Cement	French Chalk	Resins (synthetic)	Synthetic Glues
Barytes Substitute	Lead Nitrate	Rubber Accelerators	Talc
Carbonate of Potash	Manganese Borate	Sodium Acetate	Temperature Indicating Paints and Crayons
Caustic Potash (all grades)	Methyl Cellulose	Sodium Bichromate	Thio Urea
Cellulose Adhesives	Methylene Chloride	Sodium Chlorate	Wax Substitutes
Coumarone Resin	Oxalic Acid and Salts	Sodium Nitrate	Wood Flour
Cryolite (Synthetic)	Plasticisers	Sodium Nitrite	Zinc Chloride, Etc., etc.

Head Office: "Kern House" 36/38, Kingsway, LONDON, W.C.2

Branch Office: 51, South King Street, MANCHESTER 2.

Telephone: *Holborn* 2532-3-4-5 *Blackfriars* 0083/84

M&B *chemical intermediates*

FOR SYNTHETIC WORK

A selection of **M&B** *intermediates:* ETHYL BROMIDE, DIMETHYL SULPHATE, ETHYL CHLORACETATE, ALLYLAMINE, 2-AMINOPYRIDINE, SODAMIDE, ACETYL-N-METHYLUREA, HYDROBROMIC ACID.

enquiries to:

MAY & BAKER LTD.
DAGENHAM

CH 3014

THE B.A.C. TO-DAY

•

This brochure . . .

which presents a complete picture of the activities and achievements of the British Association of Chemists, pioneer Trade Union in the Chemical Profession, is of interest to all chemists and pharmacists and will be sent free of charge to any reader of this journal who cares to send a postcard with name and address to:—

C. B. WOODLEY, F.R.C.A., F.C.I.S.,
General Secretary.
BRITISH ASSOCIATION OF CHEMISTS,
EMPIRE HOUSE,
175 PICCADILLY, LONDON, W.1.

SITUATIONS VACANT

CHEMICAL Engineer, degree and institution membership, invited to join firm of Consultants as employee or in partnership. Experience essential in production of acids in heavy chemical industries, distillation processes and recovery. Willingness to seek and develop business. Box No. 2500, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

COURTAULDS Limited requires a Physicist for their textile Research Laboratory. Candidates must have an Honours Degree in physics. Research and textile experience is desirable but not essential (Ref. G/14). There is also a vacancy in the same department for a **Librarian Indexer**. Candidates should be science graduates. Library and textile experience an asset (Ref. G/15). Applicants for either position should write for a detailed questionnaire to the Director of Personnel, COURTAULDS LIMITED, 16, St. Martins le Grand, London, E.C.1. quoting the appropriate reference number.

JUNIOR **CHEMIST** required for routine analysis, mainly raw materials, by plastics manufacturers, London area. Applicants should submit in confidence usual particulars, including salary expected. Box No. 2505, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

PLANT Chemists urgently required for Process Plant Operation by large company operating in the Middle East. Applicants need not be Graduates but should have had a chemical training up to Inter. B.Sc. or National Certificate Standard with experience of shift work in either a gas, coke oven or chemical works. Age not over 30. Salary in sterling between £540 and £600 per annum, plus generous allowances in local currency, with free furnished bachelor accommodation, passages out and home, medical attention, also kit allowance and Provident Fund benefits. Apply, stating age, qualifications and experience, etc., to Dept. F.22, Box No. 2435, THE CHEMICAL AGE, 154, Fleet Street London, E.C.4.

EDUCATIONAL

HERIOT-WATT COLLEGE, EDINBURGH
(Affiliated to the University of Edinburgh)

DEPARTMENT OF CHEMISTRY

Head of Department: PROFESSOR HUGH B. NISBET, D.Sc., Ph.D., F.R.I.C., A.H-W.C., F.R.S.E., M.Inst.F.

Day Diploma Courses in Applied Chemistry:
Assaying; Oil Technology; Fuels; Paper Manufacture; Brewing; Bio-Chemistry; Pharmaceutical Chemistry; Micro-Analysis.

Entrance Examination 16th and 17th September. Three Entrance Scholarships, value £35 per annum, are offered on the results of this examination.

Session begins—Monday, 6th October.

Priority of admission is given to ex-servicemen. Other students who wish to obtain entrance should apply as early as possible.

J. CAMERON SMAIL,
Principal.

Great Possibilities for
QUALIFIED CHEMICAL ENGINEERS

VAST and far-reaching developments in the range of peacetime productions and markets of the Chemical Industry mean that the profession of Chemical Engineering will be of great importance in the future and one which will offer the ambitious man a career of outstanding interest and high status. The T.I.G.B. offers a first-class training to candidates for the Chemical Engineering profession.

Enrol with the T.I.G.B. for the A.M.I.Chem.E. Examinations in which home-study students of the T.I.G.B. have gained a record total of passes including—

FOUR "MACNAB" PASSES
and
THREE FIRST PLACES

Write to-day for the "Engineers' Guide to Success"—free—containing the world's widest choice of Engineering courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E., A.M.I.E.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE
OF GREAT BRITAIN
219, Temple Bar House, London, E.C.4

SERVICING

DRYING, Calcining, Mixing and Grinding of all materials undertaken. Cartage if required. London area. Box No. 2506, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

GRINDING, Drying, Screening and Grading of materials undertaken for the trade. Also Suppliers of Ground Silica and Fillers, etc. JAMES KENT, LTD., Millers, Fenton, Staffordshire. Telegrams: Kenmill, Stoke-on-Trent. Telephone: 4253 and 4254, Stoke-on-Trent (2 lines).

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone 3285 East.

LONDON FIRM offers complete service packing powders of all descriptions, also liquids and chemicals. Long runs only. Containers and packing cases for home and export, made on premises. Near to docks. Own rail sidings. Box No. 2331, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

PULVERISING and grading of raw materials DOHM LTD., 167, Victoria Street, London, S.W.1.

FOR SALE

STAG KB2 ROTARY PULVERISER by **EDGAR ALLEN** swing hammer type, feed opening 12 in. by 17½ in.; maximum feed size 3½ in.; output on limestone, slag, gravel, shingle, etc., 12-20 tons per hour, 25-30 h.p. required to drive. Liners and hammers constructed from manganese steel.

EDGAR ALLEN CRUSHER, jaws 20 in. by 12 in.

MARSDEN STONE CRUSHER, 24 in. by 16 in., complete with new crankshaft, three new jaws and spare toggle plates.

Secondhand **BROADBENT BLAKE STONEBREAKER** 25 in. by 12 in., capacity 15-20 tons per hour to pass 2½ in.; speed 275 r.p.m.; approx. 35 b.h.p. required to drive flat driving pulley 36 in. by 8 in.; weight approx. 14 tons 10 cwts.

PARKER SAND AND GRAVEL WASHER, comprising 4 ft. dia. by 8 ft. 6 in. long washer. Carried on four runners, 18 in. dia. Three screens arranged at end, giving three sizes, 2½ in., 1 in., and ¼ in. Drive from Girth wheel, mounted on washing chamber and bevel pinion. Capacity 25 to 30 tons per hour.

ROTARY SCREEN 18 ft. 6 in. long by 4 ft. 3 in. dia., supported at one end by rubber-tyred wheels and at the other by swing bearing. At present fitted with ¼ in., ½ in., and 1 in. screen plates. Driven by countershaft bevel gearing and fast and loose pulleys.

8 ft. by 3 ft. Triple Deck **VIBRATING SCREEN, KENNEDY,** belt driven, with shaft running in ball bearings. Out of balance weight type. Mounted on four coil springs. Mesh: top deck, 2½ in.; second deck, 1½ in. dia.; bottom deck, half ½ in. dia., half ¼ in. woven wire mesh.

One Hardinge-type conical **BALL MILL** by **FRASER & CHALMERS,** size 6 ft. 6 in. by 22 in., internal dimensions 6 ft. 6 in. dia. by 8 ft. 6 in. overall length. Mill lined with cast iron grinding plates and complete with approx. 30 cwt. charge of grinding media. Pulley drive through machine-cut gears.

One Hardinge-type conical **BALL MILL** by **FRASER & CHALMERS,** size 54 in. by 16 in. Mill lined with manganese steel lining with rotary classifier, cyclone collector, exhaust fan, and driven by 25 h.p. totally enclosed slip-ring induction motor by Lancashire Dynamo & Crypto with wall mounting oil immersed starter. No grinding media.

GEORGE COHEN SONS & CO., LTD., SUNBEAM ROAD, N.W.10, and STANNINGLEY, near LEEDS.

AIR Receivers, 40, dished ends, 4 ft. 6 in. by 22 in. dia. tested 120 lbs. hydraulic, £5 each inspected Hatcham Road, S.E.15. THOMPSON & SON (Millwall) Ltd., Cuba Street, Millwall, London, E.14.

CHARCOAL, ANIMAL, and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams, "Hill-Jones, Bochurch, London." Telephone 3285 East.

NEW AND SECONDHAND PLANT

Send your specific enquiries

to

REED BROTHERS (ENGINEERING) LTD.

Chemical Plant Department,

Bevis Marks House, London, E.C.3.

'Phone: AVEnue 1677/8

FOR SALE

MORTON, SONS & WARD LTD. OFFER

MIXING PLANT.

THREE—New and unused steam-jacketed open top **MILD STEEL MIXING PANS,** 100 gallons capacity, 3 ft. by 3 ft. dia. Overdriven stirring gear.

ONE—"U"-shaped fully tilting **MIXER** with pan 2 ft. by 2 ft. by 2 ft. deep, double sigma type blades, F. & L. pulley drive.

ONE—"U"-shaped fully tilting **MIXER** with pan 1 ft. 10 in. by 1 ft. 10 in. by 1 ft. 10 in. deep.

ONE—200 gall. open top unjacketed **MIXER,** 4 ft. 6 in. dia. by 2 ft. 3 in. deep with heavy stirring gear underdriven through crown wheel and pinion from F. & L. pulleys.

STORAGE TANKS.

Enclosed Cylindrical.

ONE—5000 gallon capacity, 24 ft. by 6 ft. 6 in. dia. by ¼ in. plate, riveted.

ONE—1200 gallon capacity, 6 ft. 6 in. by 6 ft. 3 in. by ¼ in. plate, riveted. 100 lbs. per sq. in. w.p.

ONE—900 gallon capacity, 9 ft. long by 4 ft. 6 in. dia., flat ended, welded ¼ in. plate.

ONE—600 gallon capacity, 9 ft. long by 3 ft. 9 in. dia., dish ended, welded ⅜ in. plate (two compartments).

ONE—400 gallon capacity, 10 ft. 6 in. long by 2 ft. 8 in. dia., dish ended., riveted ⅜ in. plate. 100 lbs. per sq. in. w.p.

ONE—400 gallon capacity, 5 ft. by 4 ft. dia., dish ended, welded ⅜ in. plate. 100 lbs. per sq. in. w.p.

ONE—270 gallon capacity, 6 ft. by 3 ft. dia., dish ended, welded with bolted on cover.

Enclosed Rectangular.

ONE—1600 gallons, 9 ft. by 6 ft. by 5 ft. 4 in. deep by ¼ in. plate, welded.

ONE—1400 gallons, 10 ft. by 5 ft. by 4 ft. 6 in. deep by ⅜ in. plate, riveted.

SEVERAL 1100 gallons capacity enclosed WELDED RECTANGULAR TANKS, 7 ft. by 5 ft. by 5 ft., with manhole and bolted on cover.

ONE—1000 gallons capacity, 13 ft. 6 in. by 3 ft. by 4 ft. deep by ¼ in. plate, welded.

ONE—220 gallons capacity, 3 ft. 6 in. by 3 ft. by 2 ft. 2 in. deep by ¼ in. plate, welded.

MORTON, SON & WARD, LTD., WALK MILL, DOBCROSS, Nr. OLDHAM, LANCS. 'Phone: Saddleworth 437.

ELEVEN open-ended cylinders, 8 ft. 3 in. by 3 ft. 9 in. dia., ¼ in. plate, external stiffening rings, suitable for conversion to tanks. THOMPSON & SON (MILLWALL) LTD., Cuba Street, London, E.14.

METAL Powders and Oxides. Dohm Limited, 167, Victoria Street, London, S.W.1.

NEW Stainless Steel Vertical Cylindrical Tanks, 25, 50 and 100 gallon capacity, either with handles, or mounted in rubber castored cradle.

Also Stainless Steel Water-jacketed Pans with similar capacity, arranged for heating by water, oil, gas, electricity or steam.

Also Mild Steel Jacketed Pans for 50 lb. and 80 lb. working pressure, 20/300 gallons capacity.

DELIVERY from stock.

Wanted to purchase second-hand chemical plant—best prices given.

THE MANICRAFT ENGINEERING COMPANY LIMITED
Pryme Street Mills, off Chester Road, Hulme, Manchester, 15.

Phone: 98 Staines.

OVAL-JACKETED Vacuum Oven, 7 ft. by 4 ft. 6 in. by 2 ft. 6 in.

Jacketed Vacuum Mixer, 19 in. by 19 in. by 16 in. deep.

20-in. Broadbent Electric Hydro, 415/3/50.

26-in. Belt Driven Hydro Extractor.

6 Wood Rectangular Tanks up to 500 galls.

2 Earthenware Stainless Mixers, 250 galls.

HARRY H. GARDAM & CO. LTD. STAINES.

FOR SALE

2 Vertical Stearine Presses
1 Hydraulic Baling Press
1 Shirtliffe Baling Press
48 in. Belt-driven Hydro
42 in. Under-driven Hydro
Jacketed Mixing Pan, 7 ft. dia., 9 ft. deep
7 various Filter Presses
Ball-bearing Gravity Conveyor, 6 in. pitch, 14 in. wide, 8 ft. lengths
12 Vertical Weir & Hall Steam Pumps
Several small Steam-jacketed Copper Pans
Plant and Frame Filter Press, 19 in. square
Three C.I. Sectional Tanks
Several Ball Mills, 6 ft. 6 in. by 6 ft. 8 in., Silex-lined batch type, with driving gear and clutch
Iwel-Laab size 0 Melter, motorised
Porteous size 3 Grinder with Motor
Two set 2-pair high Breaking Rolls, 33 in. long
One 18-in. 4-roll Cake Cracking Mill
One 36-in. dia. Swan Neck Hydro Extractor
Five Large Filter Presses
One Oram Barrel Hooping Press
Rectangular Storage Tank, 128-tons capacity
Ditto, 108-tons capacity
Ditto, 62-tons capacity
Sectional ditto, 16-tons capacity
Steel Sectional ditto, 10-tons capacity
3 Johnson Horizontal Oil Filter Presses fitted 24 plates 36" diameter.
1 Ditto fitted 24 plates 36" square

Write: RICHARD SIZER LIMITED, ENGINEERS, CUBER WORKS, HULL

1000 STRONG NEW WATERPROOF APRONS, To-day's value 5s. each, Clearing at 30s, dozen. Also large quantity Filter Cloths, cheap. Wilsons. Springfield Mills Preston, Lancs. Phone 2198.

WANTED

INDUSTRIAL BY-PRODUCTS, LTD., 16, Philpot Lane, London, E.C.3., will be pleased to receive particulars of any by-products, waste materials and residues.

REQUIRED, Chemical Reagent suitable for the purpose of decomposing or oxidising 15 to 20 tons iron scrap per week. This reagent should not affect any non-ferrous metals. Please write, marked "Personal," to MR. H. KLEIN, A. O. Metal Exporters, Ltd., Liverpool House, Eldon Street, London, E.C.2.

ROTARY DRYER wanted urgently approximately 30' long × 6' diameter, refractory lining if possible, oil firing. REED BROTHERS (ENGINEERING) LTD. Bevis Marks House, London, E.C.3. 'Phone: AVEnue 1677/8.

URGENTLY required. Rotary Vacuum Filter with a filtering area of approximately 150 sq. ft., together with washing facilities. Box No. 2507, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WANTED.—Supplies of Nitre Cake in ten-ton lots, Box No. 2126, THE CHEMICAL AGE, 154, Fleet Street. London, E.C.4.

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON (Established 1855).

Auctioneers' Valuers and Fire Loss Assessors of CHEMICAL WORKS, PLANT AND MACHINERY
York House, 12 York Street, Manchester.

Telephone 1937 (2 lines) Central, Manchester.

SURPLUS
RE-CONDITIONED
CHEMICAL PLANT & MACHINERY

for

IMMEDIATE DELIVERY

State your requirements

to

HODSON & CO. (MACHINERY) LTD

TOTTINGTON · BURY · LANCS

PHONE: TOTTINGTON 123

HYDROFLUORIC ACID

ANHYDROUS AND SOLUTIONS ALL STRENGTHS

Fluorides

Sodium, Magnesium, Potassium, Barium, Lead, Zinc and Artificial Cryolite.

Silico Fluorides

Magnesium, Potassium, Ammonium, Zinc, Barium.

Boro Fluorides

Sodium, Potassium, Ammonium, Lead.

Other Fluorides to Specification

PURE ACIDS FOR ANALYSIS · PLATING CHEMICALS · ACCUMULATOR ACIDS

JAMES WILKINSON & SON, LTD.

TINSLEY PARK ROAD, SHEFFIELD, 9

'Phone 41208/9 'Grams "CHEMICALS" Sheffield

INTERMEDIATE PRODUCTS
ANILINE DYES
FAST BASES FOR ICE COLOURS

Benzol, Nitrobenzol, Binitrobenzol, Nitronaphthalene, Binitronaphthalene, Xylol, Nitroxylol, Binitroxylol
Xylidine, Toluol Ortho & Para Nitrotoluol, Binitrotoluol (All Grades)
Para Nitro Ortho Toluidine, Meta Nitro Para Toluidine
ORTHO TOLUIDINE PARA TOLUIDINE

Extensive Range of Oil Colours, Acid Colours, Basic Colours, Direct Colours, Pigment Colours, Azoic Colours for Wool, also Colours suitable for all Trades
META TOLUYLENE DIAMINE META PHENYLENE DIAMINE

JOHN W. LEITCH & CO., LTD.

MILNSBRIDGE CHEMICAL WORKS

Telephone: 189-190 MILNSBRIDGE **HUDDERSFIELD** **Telegrams: LEITCH, MILNSBRIDGE**

INDIA
Khatau Valabhdas & Co., Vadgadi Bombay.

SCOTLAND
Kirkpatrick & Lauder Ltd., 180, Hope Street, Glasgow, C.2

CANADA
Prescott & Co., Regd. 774, St. Paul St. West, Montreal

TANTIRON

The original and still the best acid resisting high silicon iron alloy!

Sole Manufacturers:

Lennox Foundry Co. Ltd.

Glenville Grove, London, S.E.8

Specialists in corrosion problems

BELTING
AND
ENDLESS VEE ROPES

Superlative Quality
Large Stocks - Prompt Despatch

FRANCIS W. HARRIS & Co. Ltd.
BURSLEM - Stoke-on-Trent
'Phone: Stoke-on-Trent 87181-2' 'Grams: Belting, Burslem

THE WORLD'S GREATEST BOOKSHOP

FOYLES
FOR BOOKS

Famed for its excellent Technical Books department

New and secondhand Books on every subject

119-125 CHARING CROSS ROAD, LONDON, W.C.2

Gerrard 5660 (16 lines) ★ *Open 9-6 (inc. Sat.)*

DECOLORISING CARBON
CLARSOL BENTONITE
CLARCEL FILTRATION
KIESELGUHR

Write for samples and quotations

Tel.: Woolwich 1158 (2 lines). Grams: Scofar, Wol. London.

FARNELL CARBONS LIMITED
Conduit Road, Plumstead, London, S.E.18.

"LION BRAND"
METALS AND ALLOYS

MINERALS AND ORES
RUTILE, ILMENITE, ZIRCON,
MONAZITE, MANGANESE, Etc.

BLACKWELL'S
METALLURGICAL WORKS LTD.
GARSTON, LIVERPOOL, 19
ESTABLISHED 1869

DISCOVERY

Europe's leading science magazine. Scientists writing in non-specialist language describe their work in the various branches of science and technology.

Single copies, 1/6 monthly
Annual subscription, 19/- post free

JARROLD & SONS, Ltd.
EMPIRE PRESS, NORWICH

We are actual producers of

COPPER

ACETATE, ARSENATE, ARSENITE, ACETO-ARSENITE, CARBONATE, CHLORIDE, CYANIDES, OXYCHLORIDE, OXIDES, SULPHATES, and Special

COMPOUNDS

METALLURGICAL CHEMISTS LIMITED
GRESHAM HOUSE, LONDON, E.C.2
Works:
Tower Bridge Chemical Works, London, S.E.1
Talbot Wharf Chemical Works, Port Talbot

INDUSTRIAL RUBBER
FOR THE CHEMICAL TRADES

PROTECTIVE GLOVES AND APRONS
HOSE — TUBING
MOULDED AND EXTRUDED PRODUCTS.

Anti-Corrosion Articles:—Piping, Pipe-line Fittings, Valves, Cocks, Jugs, Buckets, Ladles, Funnels, etc.

Enquiries to —
CHARLES W. MEADOWS (LONDON) LTD.
Torwood Street, Torquay, Devon.
'Phone: Torquay 4729 'Grams: 'Meadite' Torquay

ESTABLISHED 1840

DANKS OF NETHERTON LTD

CHEMICAL PLANT
PRESSURE VESSELS
JACKETTED PANS
MIXERS RECEIVERS

ALL TYPES OF WELDED AND RIVETED STEEL FABRICATIONS

NETHERTON, DUDLEY
WORCS.

LONDON OFFICE—
329, HIGH HOLBORN, LONDON, W.C.1

CALLOW ROCK

Gas-Burnt

LIME

for all purposes

• • •

QUICKLIME
(*Calcium Oxide*)
of the highest commercial quality, in lumps or in coarse powder form

HYDRATED LIME
(*Calcium Hydroxide*)
In Standard and Superfine grades to meet most industrial requirements

• • •

The Callow Rock Lime Co. Ltd.
CHEDDAR, Somerset
Agents: TYPKE & KING, LTD., 12, Laing's Corner, MITCHAM, Surrey

GRINDING

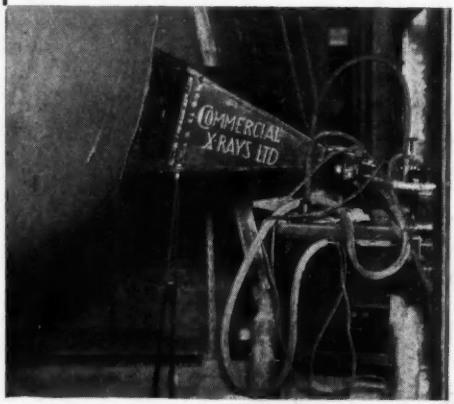
Grading, Mixing, Sieving or Separating and Drying of materials, etc., undertaken for the trade

Also Suppliers of
GROUND SILICA, FILLERS, AND CHEMICALS

JAMES KENT LIMITED • MILLERS

MANOR STREET, FENTON
STAFFORDSHIRE
Phone: Stoke-on-Trent 48835/6/7 (3 lines) Grams: Kenmll, Stoke-on-Trent

MOBILE X-RAY SERVICE



for

THE EXAMINATION OF WELDED PRESSURE VESSELS & STRUCTURES ON SITE

APPROVED TEST HOUSE AND MOBILE X-RAY SERVICE FOR LLOYDS; MINISTRY OF SUPPLY; AIR REGISTRATION BOARD, ETC.

COMMERCIAL X-RAYS, LTD. FOUNDRY LANE · SMETHWICK 40
TELEPHONE: SMETHWICK 0846/7 STAFFS. TELEGRAMS: GAMMARAYS, B'HAM.

"STILL LEADING"
For CHEMICAL & ALLIED TRADES

ACID RESISTING CEMENTS & LININGS

For PICKLING TANKS, FLOORS, DIGESTERS, KIERS, STONE, CONCRETE, BRICK, WOOD AND IRON VESSELS

RIZISTAL

PICKLING TANKS 40 FEET LONG WORKING SUCCESSFULLY

AN ALL BRITISH PRODUCT

RIZISTAL TRADE MARK

RESISTS

Formaldehyde, Alcohol, Oils, Greases and Tar Acids, Benzene, Toluene Compounds HCl, H_2SO_4, HNO_3, and H_3PO_4 mixed HNO_3 and HF Acids, Aqua Regia, Formic, Acetic, Lactic, Oxalic, Chromic Acids, Bisulphites, Hypochlorites, Mixed Acids, Peroxides, Nascent Halogens and Alkalies.

UNDER STEAM PRESSURES

SOLE MAKER *OVER 50 YEARS' EXPERIENCE*

JOHN L. LORD
WELLINGTON CEMENT WORKS
TELEGRAMS: "CEMENT" PHONE: BURY 517
BURY, LANCASHIRE

Printed in Great Britain by THE PRESS AT COOMBELANDS, Ltd., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154, Fleet Street, E.C.4, 9 August 1947. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.